6th IFAOM-Asia Scientific Conference

"Benign Environment and Safe Food"

7th – 11th September 2004
Yangpyung / Korea

Organized by

Yangpyung county,
Research Institute of Organic Agriculture / Dankook Univ.
Korean Organic Farmers Association

Supported by

Ministry of Agriculture and Forestry ,
Rural Development Admistration,
Korea National Tourism Organization,
Kyonggi Province
Natioal Agricultural Cooperative Federation

Organizing Committee

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Prof.Dr. Sang Mok Sohn

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Mr.R.Bantiles / Philippines

Prof.A.Koocheki / Iran

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Mr.Keerthi Mohotti / Sri Lanka

Dr. A. Daniel / India

Prof.V.S.Devadas / India

Mr.Jin Young Jeong / Korea

Dr. Louise Luttikolt, IFOAM

Dr. Hyeong Jin Jee / Korea

Conference Programme of 6th IFOAM-Asia

Including 3rd ARNOA Conference and Organic Food Wellbeing Fair
Gymnasium & Eco-Agriculture Extension Hall, Yangpyung / Korea
September 7 – 11, 2004

	IFOAM-Asia Conference	ARNOA Conference	Organic Food Wellbeing Fair
Venue	Yangpyung Gymnasium (YPG) / Eco-Agriculture Extension Hall (EEA)	Eco-Agriculture Extension Hall (EEA)	Yangpyung Gymnasium (YPG)
9/7 (Tue)	13:00-14:30 Registration (YPG)		11:00 Opening Ceremony
	14:00-14:40 Opening Ceremony (YPG)		
	14:40-16:20 Plenary (YPG)		
	16:20-16:30 Coffee Break		
	16:30-17:30 Session I (YPG)		
	18:30-20:30 Reception (Hanwha Condo)		
9/8 (Wed)	09:30-12:00 Session I (EEA Auditorium) 09:30-12:00 Session II (EEA Seminar Room)	09:30-10:00 Opening ceremony (EEA Auditorium) 10:00-12:00 Session I (EEA Seminar Room)	
	12:00-13:00 Lunch Break	12:00-13:00 Lunch break	
	13:00-15:00 Session III (EEA Auditorium) 13:00-15:00 Session IV (EEA Seminar Room)	13:00-15:00 Session II (EEA Seminar Room)	
	15:00-15:15 Coffee break	15:00-15:15 Coffee break	
	15:15-17:15 Session V (EEA Auditorium) 15:00-17:15 Session IV (EEA)	15:15-17:15 Session III (EEA Seminar Room)	20:00 Closing Ceremony
9/9 (Thu)	09:30-12:00 Session VI (EEA Auditorium) 09:30-12:00 Session VI (EEA Seminar Room)	09:30-11:15 Session IV (EEA Seminar Room) 11:15-12:00 General Discussion on the ARNOA Standard (EEA Seminar Room)	
	12:00-13:00 Lunch break	12:00-13:00 Lunch Break	
	13:00-15:00 Session VII (EEA Auditorium) 13:00-15:00 Session VII (EEA Seminar Room)	13:00-15:00 Reading & Discussion (EEA Seminar Room)	
	15:00-15:15 Coffee break	15:00-15:15 Coffee break	

	15:15-17:15 Session VIII (EEA Auditorium)	15:15-17:15 Reading & Discussion (EEA Seminar Room)	
	15:15-17:15 Session IX (EEA Seminar Room) 15:00-17:15 Discussion on the Organic Agriculture Principles (EEA Seminar Room)		
9/10 (Fri)	09:30-12:00 Session X (EEA Auditorium) 09:30-12:00 Session IX (EEA Seminar Room)	09:30-12:00 Reading & Discussion (EEA Seminar Room)	
	12:00-13:00 Lunch break	12:00-13:00 Lunch break	
	13:00-15:00 Session X (EEA Seminar Room) 13:00-15:00 Session XI (EEA Seminar Room)	13:00-15:00 Reading & Discussion (EEA Seminar Room)	
	15:00-15:15 Coffee Break	15:00-15:15 Coffee break	
	15:15-16:45 Discussion of Korean Declaration (EEA Seminar Room)	15:15-17:15 Reading & Discussion (EEA Seminar Room)	
	15:15-16:45 Short Briefing to Korean Organic Farmer & Local Peoples on the Conferences (EEA Seminar Room)	17:15-17:30 ARNOA Declaration (EEA Seminar Room)	
	17:00-17:20 Closing Ceremony & Declaration(EEA Auditorium)		
9/11 (Sat)	10:00-12:00 IFOAM-Asia GA (EEA Auditorium)		
	12:00-13:00 Lunch Break		
	13:00-15:00 IFOAM-Asia GA (EEA Auditorium)		
	15:00-15:15 Coffee Break		
	15:15-17:15 IFOAM-Asia GA (EEA Auditorium)		
	17:15-17:30 Closing Ceremony & Declaration (EEA Seminar Room)		

Schedules of Pre-Conference Tour and Daily Tour Service

<table>
<tr><th colspan="2">Pre-Conference Tour</th><th colspan="2">Day Tour to Seoul</th><th colspan="2">Day Tour to Yangpyung County</th></tr>
<tr><td>9/4 Sat</td><td>cheonan
(Dankook University)

20:00 Check in Hotel

** Airport Schuttle Bus is available to Cheonan from Seoul airport. It takes about 1.5 hrs. Please contact to Prof. Sang Mok Sohn (Mobile 016-428-2939) to send staff in Cheonan bus terminal to receive you before you get on the schuttle bus</td><td rowspan="4">9/9 Thu</td><td rowspan="4">09:30 Leave Venue
10:30 Seoul Downtown
11:30 Secret Garden
13:00 Lunch
14:00 Kyungpuk Palace
15:00 Itawon market
19:30 Hotel</td><td rowspan="2">9/11 Thu</td><td rowspan="2">09:00 Leave Venue
09:30 Yongmun temple
11:30 Watershed area
12:00 Lunch
13:00 Dumulmeori Farm
15:00 Organic Food Processing
16:00 Organic Vegetable Restaurant
17:00 Direct Market
18:30 Venue</td></tr>
<tr><td>9/5 Sun</td><td>09:00 leave Hotel
09:15 Research Institute of Organic Agriculture, Dankook University
12:00 Lunch
13:00 Sesil Natural Enemy Company in Nonsan
16:00 Organic Farm
18:00 Dinner
19:00 Hotel</td></tr>
<tr><td>9/6 Mon</td><td>09:00 leave Hotel
10:00 NIAST, Suwon
12:00 Lunch
14:00 Hanaro Mart
16:00 Korean Organic Farmer's Association
19:00 Dinner
20:00 Hotel</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>9/7 Tue</td><td>08:00 leave Hotel
08:30-10:00 Watershed Yangpyung
10:00 Arrival Venue</td></tr>
</table>

6th IFOAM-Asia Conference

"Benign Environment and Safe Food"

7th - 11th 2004, Yangpyung / Korea

Conference programme

▣ Opening Ceremony (Mr.Dae Soo Kim / Korea)
-Opening Address - Mr. Vaheesan - Coordinator of IFOAM-Asia
-Welcome Address - Mr. Sang Man Huh - Minister of MAFF, Korea
-Welcome Address - Mr. Kenji Matsumoto - IFOAM World Board (Tentative)

▣ Plenary (Dr. H. J. Jee, RDA / Korea)
-Reviewing the Principles of Organic Agriculture - Dr. A. Daniel - India
-Worldwide Organic Agriculture - Mr. Kenji Matsumoto - Japan
-Why the necessity to amend the basic standard on organic agriculture for the Asian community
 - Mrs. Eisen and Mr. Leung / China
-Organic Seed – Ranjith De Silva – Sri Lanka

▣ Session I: Organic Agriculture in Asia (Moderator; Mr.Vaheesan / Sri Lanka)
-Organic Agriculture Development in China - Jianhua - China
-Organic Agriculture in Nepal - Country Report - Yadav - Nepal
-Organic Movements in Iran - Koocheki - Iran
-Organic Farming Style Krisoks - Hossain - Bangladesh
-The Status of Organic Agriculture in Palestine - Hijawi - Palestinian
-Organic Agriculture in Korea - Jin Young Jeong - Korea
-The Modern Technique for Organic Rice Cultivation in Korea -Korea

▣ Session II: Organic Seed and Indigenous Knowledge (Moderator: Mr.R.Bantiles / Philippines)
-Production of Organic Seed of Groundnut - Savaliya - India
-Seed Keepers - Vijayalakshmi - India
-Seeds for Survival - Umesh Lama - Nepal

▣ Session III: Organic Feedstuff Production and Animal Welfare (Moderator: Prof.A.Koocheki / Iran)
-Assessment of Farm Animal Welfare using Organic Animal Husbandary Standards as Yardstick - Chander - India
-Feeding Meat Chickens on the Grassland under Trees - Wuqijin - China

-Using Preventive Measures and Indigenous Technical Knowledge to Control Livestock Disease in Dairy Cattle - Mukherjee - India
-Organic Beef and Organic Feed in Australia - Rod May - Australia

▣ Session IV: Organic Agriculture, Rural Development and Eco-tourism (Moderator: Dr. Dong Ju Choi / KAFA / Korea)

-Techniques in Producing Organic Foods -Korea
-Employment Generation in Rural Sector by Using Organic Agriculturehood - Mukherjee - India
-Rural Development Possibility through Smallholder Organizations - Amitabh K Singh - India
-Social Legal and Economic Aspects of Organic Agriculture in Bangladesh - Hossainact
-Status of use of Organics in Crop Production - Thakur and Sharma - India
-The Role of Organic Farming in Addressing the Issue of "the Rural Development in China" and Some Suggestions - You Wenpeng - OFDC / China

▣ Session V: Organic Food Quality and Human Health (Moderator: Ms Jacquline Hassig-Alleje / Philippines)

-Organic Farming - Jivraj - India
-Organic Food Subscription Schemes in Emerging Organic Markets - Haldy - Germany
-Retrospect and perspective of Chinese Organic Food Development - Li - China
-Nutrition and Food Security in India through Local Marketing of Minor Millets and Medical Plants Introduction - Dr. A. Victoria & Mr. P. Mariaselvam

▣ Session VI: Environmental Impact and Biodiversity (Moderator: Mr.S.P.Yadav / Nepal)

-Environmental Impact and Biodiversity Conservation Using Organic Farming from Organic Waste
-Environmental, social and economic consequences of converting to organic shrimp farming - China
-Geobiology in Biovedic Agiculture - Pawan Kumar Singania - India
-Reinforcing Indigenous Knowledge System for Sustainable Environment - Sabapathi - India
-Significance of Microbial Tools in Organic Farming - Thakral - India
-Traditional Knowledge and Biodiversity - Chandan Mukherjee - India

▣ Session VII: Organic Rice Cultivation and Duck-rice Farming (Moderator: Mr.S.Hashimoto / Japan)

-Community based organic farming - Sarker - Bangladesh
-Organic Rice Production with Microbial Inoculants - Yadav
-Principles of Organic Agriculture - Luttikholt and Vijayalaksmi
-Use of BM Technology in Integrated Nutrient Management for Rice-Wheat and Cotton Production - Tahir Hussain
-How to manage a pest and disease in organic rice field - Nutan Kaushik
-Organic Basmati - Promila Sharma - India
-Status and present Environment dimensions in Paddy Chain and potentials of Organic Farming in India - Ravi - India

▣ Session VIII: Gender Imbalance in Agriculture Policy Making Bodies (Moderator: Mr.Keerthi Mohotti / Sri Lanka)

-Acknowledging the Role of Gender in Farming - Shahid - bangladesh
-Gender Imbalance in Agricultural Policy Making Bodies - Shankar - India
-Gender, Resources and Strategies for Change in Asia's Agricultural Decision-making Bodies - Asha Kachru - Germany
-Gender Imbalance in Agricultural Policymaking Bodies - Namita Mukherjee - Society for Equitable Voluntary Actions / India

▣ Session IX: Local Marketing and Certification (Moderator: Dr. A. Daniel / India)

-A New Concept in Consumer - Producer Cooperation - Mukherjee _ India
-Experience of Peermade Development Society in Organic Production and Marketing
-Madams organic products, social qualities with equal and fair trade its constrain and future
-Opportunities and Strategy for Promotion of Non Certified Organic Farming in the Drylands of India - Arun K Sharma - India
-Organic Market Development - Chandrehekar - India
-Status of Marketing of Organic Products in Mountain Region of Uttaranch India - Sharma - India
-Organic Bazaar: A local Marketing Initiative in Kerala - V.R.Harikrishnan - India
-Organic Bazaar: A New Concept in Comsumer-Producer Cooperation - Chandran Mukherjee – Society for Equitable Voluntary Actions / India
-Organic Farming of Medicinal Plants and Alternative Marketing - Anne Victoria & P. Mariaselvam - India

▣ Session X: Appropriate Technique for Asian Organic Farming (Moderator: Prof.V.S.Devadas / India)

-Integrated Dryland Weed Control - Hui Xu - China
-Organic Cultivation of Vanilla - Moorthy - India
-Response of Organic Mulching Practices on Weed Management and Yield of Cotton - R Raman - India
-The Practices of Organic Tea in China - Liuxin - China
-Organic Production of *Matricaria chamomilla L* - Jahan & Koocheki
-Searching for Potential Biopesticides against yellow vein masaic virus disease of Okra - Pramanik Paper - India
-Crop protection in organic vegetables farming through the use of Melia azedarach - Bhat - Nepal
-Effect of Integrated Nutrient Management on the Growth and Yield of Finger Millet - R Raman - India
-Sustainable Organic Groundnut-Wheat Production Technology in drought area - Parakhia - India
-Incidence of Shot hole borer Infestation in Tea as Influenced by Organic and Conventional Crop Management Systems -Keerthi Mohotti - India
-Sustainability of organic tea cultivation proven through establishment and growth of root system - Keerthi Mohotti- India

▣ Session XI: GMO Rice (Moderator: Mr.Jin Young Jeong / Korea)

-GE Rice: Hope or Threat? - Angus Lam - Greenpeace China
-Ecological Risk of GE Rice - Doreen Stabinsky - Green Peace International
-Threats of GE Rice to Organic Rice Development - Rogelio Bantiles - ARNOA

▣ Discussion Session: Organic Agriculture Principles (Moderator: Dr. Louise Luttikolt, IFOAM)

▣ Poster Presentation

-PAN Germany's "Online Information Service for Non-Chemical Pest Management in the Tropics, OISAT Infor" - Vaheesan - Bangladesh
-Wise Use of Water Hyacinth as Hydrophonics for Sustainable Livelihood - Bangladesh

▣ Closing Ceremony

-Korea Declaration
-SAIKA Award
-Closing speech - Prof. Prahba Mahale - IFOAM World Board
-Closing Remarks - Mr.Gerlad A. Herrmann - IFOAM Vice-President

3rd RDA/ ARNOA Conference on Organic Rice Cultivation

8th – 10th September 2004
Yangpyung / Korea

1st Day of ARNOA Conference

Opening Ceremony 09:30 – 10:00

- Opening Address ARNOA President, Prof.Dr. Sang Mok Sohn
- Welcome Address RDA Administrator, Dr. Jeong Soo Sohn
- Welcome Address IFOAM World Board, Prof. Prabha Mahale
- Welcome Address KOFA President, Mr. Jin Young Jeong

Session 1 10:00 – 12:00 Chair: Dr. H.J Jee

Application and Effect of Rice-duck Symbiosis
Zhang Jibing, Xie Biao, Zhou Zejiang / China

Biological Nitrogen Fixation in Organic Rice Cultivation in the Indian Concept
S.K. Thakral / Inida

Cultivation Practices of Rice in Uttaranchal, INDIA: Specific ref. to “Biosafe Crop Protection”
Vinod Kumar Bhatt, Hari Raj Singh / India

Changing the Rice Farming Strategies through Organic Techniques in Bangladesh to alleviate Poverty and to save the Human Health and the Nature.
Ahmed Babul / Bangladesh

Vermicompost – a Potential Source of Organic Plant Nutrients for Production Sustainability in Rice–Rapeseed–Greengram Cropping Sequence in Lower Gangetic Plains of Eastern India.
Mahadev Pramanick, Arup Kumar Das, P.K. Jana, Abhijit Duary / India

Lunch Break 12:00 – 13:00

Session 2 13:00 – 15:00 **Chair: Dr. Alexander Daniel**

Rice Cultivation for Food Security at Varanashi Farms
Varanashi Krishna Moorthy, Ashwini Krishna Moorthy / India

Effect of Pests Control and Economic Benefit Analysis in Organic Duck-Rice System
XI Yunguan, QIN Pei, HAN Caiming, FAN Weimei / China

Effect of Foliar Nutrition through Organic Sources on Growth and Yield of Rice
R. Raman, G. Sampath Kumar, S. Vasanthakumar / India

Sustainable Rice Production: The Use of Indigenous Knowledge in Bangladesh
Arif Hossain Sarker, Roucksana Begum / Bangladesh

Low Cost Technologies for Organic Rice Production
Jose Mathew, C.R. Elsy / India

Organic Rice Cultivation; Some considerations under humid tropical conditions.
V.S. Devadas, Kerala Agricultural University / India

Coffee Break 15:00 – 15:15

Session 3 15:15 – 17:15 **Chair: Mr. Shinji Hashimoto**

Draft of Standard "Organic rice cultivation"
Le Van Hung / Vietnam

Production Technology for Organic Rice
R.Raman and G.Kuppuswamy, Annamalai University, Tamil Naud / India

Farming System Models for Organic Rice Production
Jose Mathew / India

Integrated Rice-Duck farming for Sustainable and Environmentally Compatible Agriculture Development in Bangladesh.
Abul Hossain / Bangladesh

Organic Rice Farming in the Tropics and Subtropics
Prahba Mahale / India

Resources Conservation Technology (RCTs) in Rice
I.S. Hooda / India

2nd Day of ARNOA Conference

Session 4 09:30 – 10:30 **Chair: Prof. Jose Mathew**

Soil Fertility and its Management on Organic Rice Cultivation in Bangladesh
Afzal Hossain Bhuiyan, Qazi Khaze Alam / Bangladesh

Grain yield Component Analysis of Irrigated Lowland Rice Ferilized with Compost and Chemical Fertilizer
Teodoro C. Mendoza, Donato Romulo C. del Castillo, David King / Philippines

3rd Draft of ARNOA Standards for Organic Rice Cultivation
Sang Mok Sohn / Korea & Alexander Daniel / India

Discussion Session 10:30-12:00 **Chair: Mr. Chris May**
"Asian Standards and Harmonization"

Lunch Break 12:00 – 13:00

Session 5 13:00 – 15:00 **Chair: Mr. Rogelio Bantiles**

Discussion on the Part of "Preface, Transition and Conversion"

Discussion on the Part of "Requirement of Production Base and Environment"

Discussion on the Part of "Cultivation Model"

Coffee Break 15:00 – 15:15

Session 6 15:15 – 17:15 **Chair: Dr. Prahba Mahale**

Discussion on the Part of "Choice of Variety"

Discussion on the Part of "Cultivation"

Discussion on the Part of "Nutrient Management"

3rd Day of ARNOA Conference

Session 7 09:30 – 12:30 **Chair: Prof. I. S. Hooda**

Discussion on the Part of "Irrigation"

Discussion on the Part of "Plant Protection"

Discussion on the Part of "Harvesting, Drying & Processing"

Lunch Break 12:30 – 13:30

Session 8 13:30 – 15:30 **Chair: Prof. S. K. Thakral**

Discussion on the Part of "Processing, Packing, Storage, Transportation and Trading"

Discussion on the Part of "Quality Standards"

Discussion on the Part of "Certification"

Coffee Break 15:30 – 15:45

Session 9 15:45 – 17:15 **Chair: Dr. Nutan Kaushik**

Discussion on the Part of "Permitted Substances"

General Discussion / (or Finalization) of ARNOA Standards of Organic Rice Cultivation

Further Action Plan

3rd ARNOA Declaration

Closing Ceremony 17:15 – 17:30

Agenda of the 6th General Assembly of IFOAM Asia

1. Opening of the assembly
2. Appointment of the office bearers
3. General assembly procedure
4. Approval of agenda
5. Approval of minutes of the 3rd General assembly
6. Regional coordinator's report
7. Result/findings of the Asian membership survey and its analysis
8. Discussion on the future structure of IFOAM Asia & Future plan
9. Presentation of IFOAM-Asia Board / candidates and s/elections
10. Discussion on 'principles of Organic agriculture' (guided by the IF OAM head Office
11. Bid for the 7th IFOAM Asia conference
12. Closing Remarks

Contents

Opening Address

6th IFOAM Asia Conference 2004 , Yangpyung county, Korea

Honourable minister,
Distinguished guests,
Ladies and Gentlemen

It is my great pleasure to address you all at this unique gathering mainly because the venue of the sixth IFOAM Asia conference and General assembly and the third ARNOA conference was the venue for the first IFOAM Asia conference in the Asia region. As you knew, South Korea hosted the first conference and it is now hosting the sixth IFOAM Asia conference in the year 2004. I am sure that this venue back again creates space for deliberations among you all to revive the role and the process of the regional movement into the future.

As many of you are aware, IFOAM Asia, the regional group of IFOAM international has been active in the region in uniting the organic movements in Asia in the past years. If you look at the over all membership of IFOAM international, we from Asia forms one of the biggest regional group with membership numbering to 149 with 25 associates. Therefore, our share of contribution to the world organic movement could make significant impact towards creating a fair organic world.

I am particularly happy to see once again the organic activists, who have gathered from various parts of Asia and other continents. As you knew the 6th conference and general assembly was originally scheduled to be held in 2003 and due to the threat posed by SARS epidemic, the organising committee had to postpone it to September 2004. When we postponed, we thought it would discourage the motivation of many members of IFOAM in Asia to come together once again.

Nevertheless, the time seems to have run pretty fast and it is evident that we have come together for another unique gathering in the region once again. I am delighted and thrilled to see such a marvelous gathering of organic activists from different corners

Those of you have got associated with IFOAM Asia knew that our regional movement has seen lots of development amidst ups and downs on our way in the past. This conference, by coincidence, has given us a unique opportunity to deliberate on further activating the regional movement so that, it becomes an association of all organic movements in the region for better service delivery among IFOAM members and non members in Asia.

According to a study done by the Asian Development Bank (ADB) in the Asia – Pacific region, there are 212 million hectare land, which has got degraded due to inappropriate agricultural activities. Another study conducted by the United Nations Environmental Programme (UNEP) has concluded that approximately 850 million hectares of land is having some degree of land degradation, representing more than 28% of the land in the region. Since arable land is the basis for agricultural production, these figures are alarming the future of agricultural production in the region. Therefore, the theme selected for this conference, *Safe food and benign environment for Asian Community* is pertinent and timely.

Ladies and Gentlemen

In order to create a fair organic world, we have to start bringing dividends from our efforts to small scale organic producers and processors. We still have to achieve significant development on areas such as issues related to GMOs, production and conservation of organic seeds, implications of WTO on agriculture and smallholder farmers in the developing world, local organic standards, cost of organic inspection and certification, development of local markets.

Organic activists in Asia, have to come united in making a fair organic movement in the region. Implications of international treaties and national level policies have to synchronise with the needs of marginal and disadvantaged organic producers and farmers, since existing policies in many countries in Asia are often unfavourable towards bringing benefits to those farmers. It is the se farmers collectively contribute to conserve environment and natural resources. In order to activate and strengthen the hands of such producers, we have to find appropriate strategies and approaches in collaboration with governments to find sustainable solutions. I could mention as an example that many countries in Asia have succeeded to convince governments and agricultural main stream organisations to enact laws and regulations and develop policies for creating a situation conducive for organic agriculture development at national level. The recognition given to organic agriculture by certain governments in some countries in Asia should be a head way for other countries in the region to follow. It should help not only to the well being producers but also to contribute for creation of benign environment for the wellbeing of masses. As the theme of the conference set in Korea, I am sure that our unity in Asia as organic activists would give us the necessary strength and motivation for further development and conservation of environment and natural resources in Asia.

Finally, before I conclude, I have to promptly mention that the organising committee in Korea has put invaluable efforts in the past three years to organise a nice gathering here in Yangpyung County for you all to come together and get updated about the development of organic agriculture in the region. As it is evident today, this gathering gives lot of exposure for many of you to take ample amount of know-how and experience to your own countries.

On behalf of IFOAM Asia and you all, let me congratulate the tireless efforts and energy brought in by all the members of the Organising committee to make this conference a reality and a success.

I also like to express our sincere gratitude to the Korean Government and to all the other funding agencies such as Misereor, Bread for the World, SAIKA foundation for Technology in Japan and the private sector companies for supporting this fantastic gathering.

I wish you all a fruitful and pleasurable stay in Korea for the coming few days.

Thank you for your attention.

S. Vaheesan
Co-ordinator
IFOAM Asia

Helvetas Sri Lanka
no. 21, Raymond Road
Nugegoda 0170
Sri Lanka.

Why the necessity to amend the basic standard on organic agriculture for the Asian community

Rochelle Eisen / Frank Leung
Palm Village Organic Rice Cultivation Project
Xinhui, Province of Guangdong, China

Opening Statement

Organic farming is a growing segment of Chinese agriculture, but encouraging organic production is severely hampered by high cost of certification. Other obstacles to adoption of organic farming by Chinese farmers include high managerial cost, lack of marketing and infrastructure and inability to capture market economies.

Farm returns are diminishing as consumers continue to demand cheap food. With the incredulous growth rate of global urbanization very few consumers appreciate farming as being essential to life. Unconsciously most do realize that food is a direct product of farming or fishing, but few understand its importance.

We all know that food may be produce in small quantities by local farmers or large-scale industrialized farming systems. It may be a mixture of many ingredients or raw materials. It may be the result of food technology or scientific know how in terms of breeding animals or growing crops. Until the 1990s most farming techniques used at least throughout the Northern Hemisphere have been a major source of water, land and air contamination in addition to having a negative impact on human health and delivered diminishing returns to farmers. Organic farming has attempted to reverse these trends.

By establishing itself as a viable alternative, the Organic movement has become a multi-billion dollar business in Europe and in North America: and has become known as "The Industrial Organic Complex". Yet, Asian farmers have not been included in this global picture. The idea of growing food that captures high-value markets to boost farm incomes simply has not reached many farmers in Asia, especially farmers growing rice.

Facts

The intention of this paper is not to discuss the policies set by IFOAM nor to establish an opinion on organic farming as a process, but simply to supply a reality check on organic farming in China and in Asia.

We are sure that we all agree it is important for policies to be consistent globally. This then requires global policy makers to set a framework that allows for regional variations and cultural considerations. It is true that farmers have the first responsibility to ensure that the guidelines are adhered to. But sometimes we must question do we have a level playing field? Are the guidelines applicable in all circumstances? Are we going to factor in trade policies of different nations? So on and on …….

In the not too long distant past, food products that were approved in the country of production were generally granted unrestricted access to global markets. Rising concerns about food safety and the environment, social, economic and ethnic aspect of food production has led many countries to change their practices and require a domestic review of the food products before an importation permit is granted. As a result, this has adversely affected the free flow of trade in food products.

There currently are seven international bodies coordinating and regulating different aspects of food safety. In the matter of organic food, the free flow of trade is further complicated with the lack of a policy that clearly recognizes regional cultural knowledge and experience. As a result, we have seen NGOs and private organizations setting up their own guidelines based on the IFOAM Basic Standard to satisfy the requirement of their region. This is not really helping Asian organic farmers to address international certification criteria or improving their bottom lines. The real concern currently surrounding the governance of the organic standard is the lack of regional sensitivity in a global sense and the inability to deal with the needs of local organic farming community, despite IFOAM's code of conduct that clearly states ' …….. a worldwide code was preferable to regional initiatives given that organic trade was global but that there needed to be flexibility in the implementation of the code, the idea that the code should focus on trade and not traders and the idea that one person's right in the organic supply chain is another's responsibility…….. It was agreed that the code should be used as a learning process to encourage IFOAM trade members to address social justice issues in their day-to-day practices. It needed to be relatively simple, allowing each company to interpret and analyse the code in its own way.'

European countries have long been involved in setting regulation on organic products. Recently, the U.S. government's effort to regulate organic production has led USDA to set a national organic standard. By July 16, 2004 the USDA has accredited 55 domestic USDA certifying agents and 39 foreign certifying agents to conduct third party certification of organic production and handling that meets the USDA National Organic Program's criteria. The NOP regulation requires all except the smallest organic grower (less than $5000 in gross sales) be certified by a State or private agency accredited under USDA's national organic standards. In contrast, the Organic Food Development Center (OFDC) based in Nanjing is the only Chinese organic certification agency accredited by IFOAM since 2002 and organic certification is completely voluntary.

No matter where a farmer is located in the world, whenever they seek organic certification the big questions that must be asked include, where is my market? Which certification body do I need to contract with to guarantee access to that market? Will my regional certifier suffice? In a way, the mere cost of the "right" certification can end up being an effective trade barrier.

As Asian countries were slow to adopt organic certification procedures, Northern Hemisphere countries have dominated the policy development process regarding organic product regulations. During the first ARNOA conference, Mr. Luo of the China National Rice Research Institute presented a paper on Organic Rice Cultivation in Zhejiang Province / China. Mr. Luo was correct that growing of organic rice production in China is in its infancy. However, there is dissatisfaction surrounding organic certification processes as well as an issue of concern around some organic standards. As Dr. Sohn of Dankook University commented in the first ARNOA conference, the IFOAM basic standard and Codex guideline do not serve the needs of Asian organic rice growers. The difference in social economic condition, geological condition and in some cases cultural practices between Asian and western agriculture system need to be recognized by the global organic community and amendments made to the IFOAM Basic Standard.

Maybe what really needs to be dealt with first is why is China and the rest of Asia interested in organic farming and seeking recognition from the rest of the world? The answer is simple, for the same reasons as any other farmer elsewhere, to improve their financial return for the energy spent, to improve the quality of life for the family unit and the surrounding environment.

Studies

To overcome food shortages, China relied heavily on agro-chemicals over the past decades. This has adversely affected the environment, the agro-ecosystem and human health in China as well as diminished returns to the farmers. As part of the solution, in 1999, an organic rice cultivation project between the farmers of Xinhui, Guangdong province and the South China Agricultural University in Guangzhou was founded with the support and assistance by the local government of City of Jiangmin. By 2002, farmers under the guidance of the South China Agricultural University in Guangzhou and the Council of Early Childhood & Education Services (CECES) in Hong Kong have successfully converted 74.6 sq. hectares into organic rice cultivation with 636 individual farming families participating in the project. The crop is certified by CECES, a NGO organization and a regional self-appointed certification agency.

Also in 2002, we began a process to evaluate the market interest for the organic rice from Xinhui, the global certification process, and the cost effectiveness of the project. What we discovered was fascinating.

In China alone, there are six different regions of rice growing paddy fields. The majority of these regions can only produce one crop annually, whereas in the subtropical Pearl River region in the southern Guangdong province can produce two rice crops easily each year, first harvest between late June and early July and the second at the beginning of November. A large percentage of this organic rice is shipped to the Hong Kong market under CECES certification. Secondly, we learned that CECES does not only serve as the certifier as it also plays a technical consultant role to these organic farmers. Here is a conflict of interest that most of the organic global community would not accept. However, interviewing farmers involved in the project suggested that besides being paid better prices for their crops that they would not have participated in the project unless they had received support and advice from CECES, because without that support they would not have had the capacity to deal with the changeover. Thirdly, the reality was and still is that CECES is able to minimize the cost of certification. These factors were enough to facilitate these farmers return to historical regional methods of rice paddy production that we now know as organic farming.

Further we learned that the CECES certification process places an emphasis on residual test results and Asian consumers have come to rely on these results. And finally we found another compliance problem. As Dr. Sohn has pointed out in his first ARNOA conference presentation, most of the paddy fields are located on very small farming units, some as small as 0.5 hectares. How can you complete a compliant crop rotation on such small parcels? Was there going to be latitude at the international level for this limitation?

Despite these potential compliance issues we continued with the evaluation process and estimated what would be the cost of certification if the rice crop were to be sold to an international market. We contacted two certification agencies (one in China and the other one in North America), both accredited by IFOAM and USDA. What we have found out was the cost of certification was simply prohibitive. The barriers to trade were too onerous for rice farmers in this region.

We had visited thousand of hectares of farmland and met with hundreds more farmers that were interested in converting back to traditional organic farming. They are faced with many daunting problems, including comprehending organic standards, which we must admit maybe enough of a deterrent for a country with 800 million people who are still participating in farming one way or the other. For example while talking to a group of farmers in the Xinhui fresh vegetable wholesale market, they questioned the feasibility of attaining any economic return by switching over to organic farming. Frankly, we do not have the answer for them.

Summary

Considering the information we have provided we must ponder if IFOAM and the western organic sector would revise the International Basic Standards to accommodate these Asia variations? Otherwise what standard should farmers in Asia or in any third world country rely upon that would be acceptable to the North and South, West and East? How are we going to assure the safety, quality, and environmental sustainability of the food supply if we cannot reach consensus on the standards that connect us all? The organic rice project in Xinhui, China has resonated a global common problem. Farmers in organic farming are consistently seeking a balance in economic return for their efforts. If the organic community cannot resolve these differences then what is the point of the entire exercise?

These issues are the core responsibilities of the policy makers, and require the active engagement of the organic farming community at large. As many of us are saying ‘No’ to globalization, we must maintain a ‘Think Global, Act Local’ vision. As Dr. Sohn has suggested ‘As much as possible, all Asians from the research and farming sector should put their ideas together to develop the Basic Standard for organic rice cultivation ……….. more than ever before, not only among NGO groups but also among government officials and scientists from institutes and universities.’

As mentioned previously the purpose of this paper is not to discuss the technical and scientific aspects of organic farming in the west or in the east, as it is fair to assume that these are the issues to be dealt with by competent researchers and scientists. The issue that needs to be dealt with by policy makers is what is the suitable balance on a socio-economic scale for farmers in the third world and in the developing countries. As supporters of organic agriculture, one must see that the word ‘organic’ must signify a great deal more than just the slogan ‘Better Food For A Better Planet’. It seems to us that there is two sets of standards within the global organic community today, a set for ‘Industrial Organic’ and another set for ‘Organic’. Whichever we are involved in is really not the question here. If we are to sustain ‘Organic Agriculture’ in the whole industrial food system, we would need to look at a level playing field for the farmers, especially those in Asia and in the third world. Although in Xinhui China, CECES of Hong Kong and the South China Agricultural University provide farmers with free seminars on organic farming and market economies, the enthusiasm showed by those farmers touched by the process is extremely high. Yet, there are still so much uncertainties and frustrations.

We all know there are many obstacles lying ahead of this great leap to organic farming, for even those in the Northern Hemisphere. Farmers especially those in Asia need support from the state and regional authorities to help to alleviate the complexity of the basic standard set out by the international policy maker.

Our vision

For the past two years, we have been researching the concept of "Organic Farmers Without Borders". ARNOA has planned to create a Cyber Library for Asian organic farming, and we want to participate in that dream. We further wish to expand these ideas into useful tools for the global organic farming community. Actions should be taken not only in the form of informative and communication purposes. It is our vision to see a greater cross border exchange of techniques and skills between researchers and farmers. We would like to have Chinese farmers traveling to Korea to learn how their counterparts deal with organic issues and have Korean farmers coming to China to participate in the organic conversion process. We feel this type of exchange can make the difference.

Epilog

Of course, there are always these questions regarding free trade, food safety and environmental issue. Once again, we admit that we do not have a perfect solution for anybody. Then, we are here looking for cooperation to solve some of the fundamental issues. To sum up some of our sentiments using one of Dr. Sang Mok Sohn's comment, 'We should work together to achieve a fair organic world. For that, we shall act together, otherwise we will never recover the neglected Asian farming from the world organic regulation and certification system.'

Organic Seed

Ranjith de Silva,
Former IFOAM-Asia Coordinator
Sri Lanka

Seed is a common resource of local farming communities who have evolved and conserved it from time in memorial. Farmers are the original breeders and custodians, owners of seed material and plant genetic resources. Through their hard work they have been able to protect the agricultural bio diversity in situ. Women in particular have been the seed keepers and also have nurtured the diversity and have been efficient seed selectors for conservation and production.

The Convention of Bio Diversity conservation (CBD) has been the one of the responses of the international community to conserve the ecological basis of biological production through the biodiversity conservations. Many countries who are interested in safe guarding nature have signed this agreement.

But today the diversity of our seed base is diminishing rapidly due to the activity of the multi national co-operations who are very much interested in creating uniform seeds, which even cannot be multiplied by the farmers in their own farms. Further these seeds are a part of a package deal, which includes the fertilizers and the chemicals for disease and pest control and the price of these material is found to be beyond the small farmers ability to pay.

However due to the influence that these companies have on governments has made the governments to support the seed companies instead of the farmers who have been protecting the diversity of seed life long. This is creating a problem for the developing countries where the poor farmers find it difficult to do their activities of seed savings without the support and indulgence of the state machinery. Thereby the developing world will loose the biodiversity, which in turn will make the farmers poorer.

I am a promoter of organic agriculture and organic agriculture do not permit Genetically Modified Seeds (GMO) because these seeds are not tested for its safety and hence we do not want to take the risk to introduce same into organic agriculture.

Organic agriculture guarantees that the food they produce is safe and nutritious and as per our experience it is not subsistence farming. If you select your seeds in keeping with the climate that you plant the seeds we can produce almost the same quantity that the Green Revolution Agriculture produced. This process is helped very much by the ability of the farmer to produce good healthy compost which could be supported by liquid fertilizers produced with good legumes, for example Glirisida and also wormi wash which is today becoming very popular in our part of the world and there are many more natural fertilizers that are being developed to support organic agriculture.

We have not done enough research due to lack of funds. Therefore, we need to develop a new strategy in the form of a farmer-centered research. We are looking forward for the scientist to support us in this venture. This is where the Governments could help us by making the agriculture officials to help the farmers to do some research on their lands and make it known to many that organic agriculture is a farming that can feed the world and also make people happy and free of diseases.

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Organic Farming in Iran

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Abstract : Iran occupies a vast area of land with a diverse climatic conditions and hence a rich biological diversity. It has been evidenced that this country has been one of the centers of evolution of agriculture and human was for the first time settled in this part of the world some 10000 years ago for agricultural activities. Traditional small scale farming was the main structure of farming communities for centuries and this has caused a tremendous accumulation of indigenous knowledge in farming practies and food production. Therefore, natural farming used to be a widespread practice not more than half a century ago and still appreciated to some extent by the farmers. However, with the advent of new technologies this has been changed and no proper alternatives have been introduced. Although there are still the so called ingnored organic farmers in this county, based on the traditional ecological farming, this has not been recognized either nationally or by the international communities in the context of new organic farming. In this paper an attempt has been made to analyze this issue in more detail.

Introduction

Iran is the second largest country in the Middle East with an area of 1.65 million Km2 . It is located between latitude 260 to 380 N and longitude 440 to 630 E, bordering from north to Turkamenistan and Azerbayejan, from west to Turkey and Iraq, from south to Persian Gulf and Gulf of Oman and from east to Pakistan and Afghanistan. Because of this wide range of latitude and longitude, this country has a diverse type of physiography, climate, vegetation and biological productivity. The climate is characterised by aridity and more than 30% of the country is receving less than 100 mm of precipitation annually.

Rangelands constitutes 55% of the total area of the country, deserts and dagraded lands 21%, forests 7.4% , agricultural lands 14.4% and urban areas, lakes and others 2.2% (1).

Today more than 16 million hectares of land in the country is engaged in agricultural practices, producing 65 million tones of food from field crops to horticultural products for a population of the same magnitude. Food self sufficiancy is more than 80%. In terms of the amount of production, Iran ranks 30th in the world, and 8th based on the diversity of products. For the export of some special agricultural products such as Pistachio, Dates and Saffron, Iran ranks first in International market. Contribution of agriculture to the GNP of the country is 26% and this sector provides job opportunity for 24% of the active labour forces in the country (9,10).

Historical Background

Agriculture has a long history in this country. It has been argued (1) that dryland farming first evolved simultaneously with domestication of goat and sheep in western part of Iran about 10000 years ago. Farmers mamaged their traditional agroecosystems for centuries with a focus on sustaining yield on a long term basis rather than maximizing them on the short term. They relyed on locally available natural resources to maintain soil fertility and to combat pests and diseases.Their farming systems had certain principles and processes in common (4).

- Holistic view on utilization of natural resources
- Optimal use of local resources with low extemal inputs
- Genetic and physical diversity
- Soil protection and conservation
- Risk minimization
  - Site-specific techniques
  - Traditional land use has been based on crop production and livestock grazing in an integrative manner. The key to understanding traditional land use is the pattern of villages and nomadic pastoralism and their associated urban market centers. Land management used to be based on indigenous farming systems, practices and knowledge associated with self reliance and family associated communities (4). This system of land use was evolved on the basis of the following structural and functional principles
  - Combination of high species numbers and structural diversity in time and space (both through vertical and horizental organization of crops and animals)
- Exploitation of a full range of microenvironments (with different soil, water, temperature, altitude, slop and fertility characteristics)
- Maintenance of recycling practies of materials and wastes
- Reliance on a complexity of biological interdependencies
- Rliance on local resources plus human and animal energy, thereby using low levels of inputs technology
- Reliance on local varieties of crops and incorporation of the use of wild plants and animals Implementation of collective production activities based on self sustained and self-sufficient communities (4).

Ecological Basis of Food Production

Ecological principles governing food production in traditional agriculture could be viewed on technical, social and econimc rationals. In technical terms two main aspects of crop production, water supply and soil fertility, was solved by the construction of subterranean canals (Qanat) and effective use of wastes, by products and animal manure, notabely structure such as pigeon towers for use of valuable manure produced by the birds. In social and economic terms collective farming and sharecropping, and also strong hirarchial nomadic command structure was notable. A short view of these components is given below.

A – Qanat: Qanat is a traditional method of ground water exraction without any external inputs, the oldest remains of which goes back to 3000 years ago. This traditional system of water provision was adjusted to th harsh and hostile environmental conditions of the country. Qanat and the culture grow up around it comprised a powerfully integrated communal system (7,8).

B – Pigeon tower: Soil fertility is the second important aspects of crop production after irrigation. When water was provided, complex pigeon tower were constracted to collect the manune from the birds. In each tower thousands of pigeon holes were arranged so that their feces drop to the middle of the floor for easy collections. The earliest of these structures is recorded to have been built more than one thousand years ago (5).

C – Pastoral nomadism: Through the centuries nomads and their herds have worked as an integrated part of the natural ecosystems. As a biotic component of the system they had their own functional properties and played an important role in the energy flow and nutrient recycling of rangeland ecosystems (2,3).
Pastoral nomadism which based on human and animal mobility was an ecological response to harsh condition of arid and semi arid environment on the following principles:
- Animal mobility according to the phenological stages of rangeland plants growth and forage availability
- Low external inputs with self-sufficient closed systems and community oriented markets
- Utilization of resources in unaccessable areas
- Herd size and combination of different species of animals
- Rational land use on the accounts of optimized resource utilization

D – Sharecropping: This feature of traditional agriculture was based on strong socio-economic incentives. A complicated arrangement of division of activities in cultivation into elements of land, water, seed, labour and draught animals was a rational way of providing incentives for farmers and involved almost the whole community in production activities. Community members often used land in common and gave each other support by sharing or exchanging labours, animals, fields or farm products. Share croppers mostly organized themselves into collective production units (6).

Present status

Although the remains of traditional systems of food production, which were completely organic both in technical and social terms, are still in operation in remote areas, they are heavily under pressure of modern technologies. However, these systems have not been regarded as organic in the present context of organic production and in fact they could be considered as ignored organic farmers.

In small farming system which account for more than 80 percent of agricultural products of the country still ecological practies are prevalent.
These include:
- Diversified crops and animals in an integrative manure
- Use of animal maure, wastes and by products for soil improvements
- Biological pests and diseases control
- Community cooperation, family labour and local market orientation

However modern organic farming is in its infant stage from the following prospects:

I - Higher Eduction: At present there is only one course on ecological agriculture at MSc level at universities. At PhD level a minor degree on ecological agriculture is being conducted which involves different courses on organic farming sustainable agriculture, multiple cropping and cropping systems. Till now only few students have finished their PhD in this program. It is hoped that in the near future a separate MSc and PhD dagree will be organized

II- Research: Topics of research conducted on ecological agriculture either as thesis in the universities or elsewhere are mainly on the following:
- Comparisons made on conventional and ecological agriculture in terms of energy efficiency, economic returns and yield criteria
- Use of biofertilizers, Mycorehyza and Rhyzobium at field and greenhouse levels
- Integrated and biological pest management
- Biodiversity evaluation
- Sustainability studies

III – Certifying bodies: There is no single certifying body at national level and in scare cases certification has been carried out by the foreign organizations mainly from Europe

VI – Number of certified organic farms and the total acerage: There is no certified organic farm and therefore no acerage, but there is a tendency towards organic produces for export purposes and this trend is growing. Some medicinal plants which are collected from the wild and are totally organic but are not certified has not been considered here.

V – Member of IFOAM: 2 case

Future prospects

These days a growing concern has been raised associated with healthy food by the policy makers and the public. On the other hands demands from international market for organic food has become a driving force for further consideration. For an effective expansion of organic food production and in order to provide incentives for the farmers the following issues must be considered:
- Implimentation of simple national standards for small farmers based on the principles of international regulations
- Affordable sevices for inspection and certification
- Establishment of national and local certifying organizations
- Econiomic incentives for production of organic food
- Capacity building, training and education
- Public awareness of the hazard of chemicals in food
- Strategic plan at national level for safe food and therefore organic production

There are emerging trends for production of organic herbs, spices, dried fruits and nuts for export purposes based on demands from foreign markets. To comply with this demand international regulations must be observed and proper national standard should be implemented.

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The Background, Status Quo and Prospects of Organic Agriculture Development in China

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Summary: This paper elaborates on the background, status quo and prospects of organic food development in China, analyzes the standards and regulation development for organic food and briefly describes the development trend of organic agriculture in China

Key words: organic food, status quo, prospects

1. Organic agriculture and organic food

Organic agriculture: though there are numerous definitions of organic agriculture, their connotations are the same. Organic agriculture refers to the agricultural production system, which follows the principle of sustainable development and the basic standards of organic agriculture, does not use any artificially made fertilizers, pesticides, growth regulators or feed additives for domestic animals, and does not use genetic engineering technologies or their products in the production process. The core is to develop and rehabilitate bio-diversity and virtuous circle of the agricultural ecological system.
Organic agriculture system is aimed at conserving and raising soil fertility and protecting eco-environment, taking into full consideration of the natural production capacities of land, farm crops, animals, marine lives and bees in various aspects of agriculture and environment and is dedicated to upgrading food and environmental qualities. Organic agricultural production follows the rules of sustainable development, minimizes external input in the production process and mainly relies on the order and theorem of nature to raise the efficiency of the ecological cycle.

Organic food: organic food originated from the English language and was directly translated into Chinese. In other languages, it may be called as ecological food or biological food. Organic food refers to all the agricultural products or by-products, which come from the organic agricultural production system, are produced and processed pursuant to organic food production standards and are certified by eligible, legitimate and independent organic food certification institutions, including cereals, vegetables, fruits, dairy products, poultry and animal products, bee honey, aquatic products and flavoring etc.

Organic products: referring to the products, which are produced in an organic manner pursuant to their respective organic standards, including organic food, organic cosmetics, textile products, forest products, bio-chemicals and organic manures etc.

2. Background of Organic Food Production in China

China has a traditional agriculture for thousands of years. Prior to the 1950s, the agricultural production that our ancestors were engaged in rarely used any agro-chemicals and had accumulated rich experience in traditional agriculture, including a great number of physical and biological pest and disease control measures still being used by people today.
Since 1980s, with the help and participation of a number of research institutes, universities and local governments, China launched and organized a bio-agriculture movement, which has helped to set up thousands of bio-agriculture demonstration villages and dozens of biological counties all over the country and extend diversified forms of bio-agriculture development technologies. All these have contributed to laying a solid foundation for organic agriculture development in China.

3. Status quo of production

In 1992, the Ministry of Agriculture approved the establishment of China Green Food Development Center. By December 20, 2003, the number of green food enterprises in the country totaled 2047 and the number of products with green food labels reached 4030. The total output of products in kind was 32.6 million tons, including 2,256,000 tons of rice, 419,000 tons of flour, 213,000 tons of edible oil, 1,843,000 tons of fruits, 129,000 tons of tea, 101,000 tons of meat products and 1,826,000 tons of liquid milk and dairy products. Annual product sales volume reached 72.3 billion yuan, and export value amounted to 1.08 billion dollars, representing 12.4% of the total sales. The area of farmland, pastureland and waters whose environment was under monitoring reached 77.1 million mu. In terms of product structure, farm and forest products and their processed products accounted for 56.5%, animal and poultry products 17.1%, aquatic products 3.3%, beverage 17.0%, other products 6.1%. 53 enterprises were graded as AA green food enterprises, which produced 119 products.

China Green Food Development Center started the research and certification work of AA green food in 1995. AA green food is quite close to organic food, but there is some difference in terms of standards and management. The establishment of green food, particularly AA green food bases has laid a sound foundation for the construction and development of organic agriculture production bases in China.

There is no concrete statistics on the development of organic food in China. However, based on the estimation of certification institutions, there were approximately 1100 enterprises (including some repetitive certifications by different certification institutions) and 2000 products that had obtained organic food certificates issued by different certification institutions by the end of 2003. Over 500 enterprises obtained their certificates from foreign certification institutions and over 500 obtained from Chinese certification institutions. The total production value of organic products reached 2.06 billion yuan (1.74 billion yuan for farm crops, 120 million yuan for wild products, 80 million yuan for animal products and 120 million yuan for aquatic products) and 150 million dollars of products were exported.

By December 20, 2003, 102 enterprises (including 2 enterprises with SGS certification) and 231 products were certified by China Organic Food Certification Center (COFCC), with a total production of 134,600 tons, annual sale volume of 910 million yuan, and 39.88 million dollars of products exported, accounting for 36.4% of the total production. Some provinces have become the key organic food producing areas. In terms of the number of certified enterprises (or number of certified products), Jiangxi Province accounted for 22% (14% in terms of certified products), Jiangsu Province 17% (12% in terms of certified products), Inner Mongolia 11% (17% in terms of certified products), Jilin Province 10% (13% in terms of certified products), Heilongjiang Province 8% (5% in terms of certified products). The certified production areas totaled 9.28 million mu, of which, 190,000 mu is for crop farming, 3.2 million is for animal husbandry, 380,000 mu is for aquaculture and 5.5 million mu is for wild products development. In terms of product structure, farm crops and their processed products represent 68%, animal products 7%, aquatic products 8%, beverages 8%, and other products 9%.

4. The Development Process of Organic Food in China

The development process of organic food in China can be divided to 3 phases:

4.1 Exploration Phase (1990-1994)

This phase is characterized by the entry of foreign certification institutions to China and the launch of the development of Chinese organic food.
In 1989, Rural Ecological Research Office, Nanjing Environment Science Research Institute, State Environment Protection Administration (SEPA), who was the first to involve in research, practice and extension of eco-agriculture, joined in IFOAM and became the first Chinese member of IFOAM. Currently, there are over 30 Chinese members of IFOAM.
In 1990, based on the application of Zhejiang Provincial Tea Import and Export Corporation and Dutch Amsterdam Tea Trading Corporation, and entrusted by SKAL, Mr. Joe Smillie, a Canadian international organic food certifier conducted a field supervision and certification of 2 tea plantations and 2 tea processing factories in Zhejiang and Anhui provinces. After the supervision, the Peihou Tea Plantation in Linan County and Linan Tea Factory, Zhejiang Province were issued an organic product certificate by the Dutch SKAL. This is the first time ever in Mainland China that Chinese professionals participated in organic product certification and supervision activities and that a Mainland Chinese farm and a processing factory obtained organic product certificate.
Concurrently, relevant theoretical research ia being done in universities and research institutes.

4.2 Initial Phase (1995－2002)

This phase is characterized by the following: China established her own certification institutions and carried out corresponding certification work. At the same time, recommended sector or organizational standards and criteria were developed pursuant to the basic standards of IFOAM.
In 1992, the Chinese Ministry of Agriculture approved the establishment of China Green Food Development Center (CGFDC), which is responsible for certification and development management of green food within China. The center creatively developed the theory of classification of green food since 1995, that is, green food is classified as A and AA (equivalent to organic food). Subsequently, it invited China Agriculture University and Chinese Academy of

Agricultural Sciences to research and develop AA green food standards and operation procedures. CGFDC has established ties and partnership with a number of European, American and Japanese certification institutions and developed Rules for AA Green Food Production Techniques pursuant to the standards and regulations of IFOAM and Europe, America and Japan, and started certifying AA green food. By the end of 2002, the number of enterprises which effectively used green food label in the country totaled 1756, and 3046 products were given green food certificates, of which, over 60 were given AA Green Food Certificate. The building of green food, especially AA green food bases has laid a sound foundation for the development of organic agriculture production bases in China.

In 1994, as approved by SEPA, the Rural Ecological Research Office, Nanjing Environment Science Research Institute, State Environment Protection Administration (SEPA) was changed to Organic Food Development Center of SEPA (or OFDC). In 2003, it was renamed as Nanjing Guohuan Organic Products Certification Center. Since the start of certification in 1995, over 300 farms and factories have passed OFDC's certification.

With reference to the basic standards for organic production and processing of IFOAM, prescriptions for organic agricultural production of the European Commission, the standards and prescriptions of organic agricultural associations or organizations of such countries as Germany, Sweden, UK, USA, Australia and New Zealand, as well as the relevant standards for agricultural production and food industry in China, OFDC developed Organic Products Certification Standards (trial) in 1999 and it was promulgated as sector standards by SEPA in May, 2001.

In March, 1999, Tea Research Institute of the Chinese Academy of Agricultural Sciences established Organic Tea Research and Development Center (OTRDC), specialized in supervision and certification for organic tea plantations, organic tea processing and special fertilizers for organic tea. In 2003, it was renamed as Hangzhou Zhongnong Quality Certification Center and was registered in the State Certification and Ratification Regulatory Commission. The center has so far certified over 200 tea plantations and tea processing factories.

Pursuant to the integrated development strategy of green food, organic food and pollution-free food under the Pollution-free Food Action Plan of the Ministry of Agriculture, CGFDC established China Organic Food Certification Center (COFCC) in October, 2002 with permission of the Ministry of Agriculture and became the first organic food certification institution registered in the State Certification and Ratification Regulatory Commission. The Rules for Organic Food Production Techniques, developed by COFCC by following the basic standards of IFOAM and the standards of Europe, America and Japan was listed as sector standards by the Ministry of Agriculture in 2003. Subsequently, the center trained 76 organic food supervisors (including intern supervisors). In order to expand the impacts of the enterprises, facilitate export of farm produce and strengthen international cooperation, COFCC has signed general cooperation agreements with SGS of Europe, JONA and OMIC of Japan. Over 120 enterprises have passed COFCC's certification.

4.3 Regularized rapid growth phase (2003-)

The official promulgation and enforcement of the Certification and Ratification Regulation of the People's Republic of China on November 1, 2002 marked the beginning of this phase. Certification of organic food is under the administration and management of the State Certification and Ratification Regulatory Commission and enters a regularized phase. Ratification and review of the organic food certification institutions were initially the responsibility of the State Organic Food Certification and Ratification Commission affiliated with SEPA. Pursuant to the Certification and Ratification Regulation of the People's Republic of China, promulgated and enforced on November 1, 2002, SEPA transferred the relevant responsibilities to the State Certification and Ratification Regulatory Commission. So far, there have been 8 part-time or full-time organic certification institutions ratified by the State Certification and Ratification Regulatory Commission.

State Certification and Ratification Regulatory Commission organized relevant departments to develop national standards for organic food and draft administrative procedures for certification of organic products in 2003.

At present, there are a few foreign organic certification institutions doing certification work in China. The earliest has been OCIA of USA, who came to work in China in 1995. OCIA established its China branch in Nanjing in collaboration with OFDC. Since then, ECOCERT of France, BCS of Germany, IMO of Switzerland, and JONA and OMIC of Japan have established their offices in Beijing, Changsha, Nanjing and Shanghai to conduct certification and ratification work in China. Over 500 enterprises have passed the certification of foreign certification institutions.

5. Standards, Laws and Regulations

On June 19, 2001, SEPA officially promulgated the Administrative Procedures for Certification of Organic Food and SEPA announced the Technical Standards for Production and Processing of Organic Food at the end of 2001.

Since China has so far not yet officially promulgated compulsory national standards for certification of organic food, the certification institutions are using their own different certification standards. CGFDC is implementing the Rules for AA Green Food Production Techniques developed based on the basic standards of IFOAM and the standards of Europe, America and Japan, COFCC is implementing the Rules for Organic Food Production Techniques, developed by COFCC by following the basic standards of IFOAM and the standards of Europe, America and Japan, whereas the Organic Tea Certification Center is implementing organic tea sector standards. Foreign certification institutions are implementing their own respective standards when they do their certification work in China. European certification institutions implement EEC2092/9l, US certification institutions implement NOP, whereas Japanese certification institutions implement JAS. Though they are implementing different standards, their principles (prohibition of synthetic agro-chemicals, prohibition of trans-gene technologies and biology, buffer zone, rotation farming, sales control etc.) are primarily consistent. However, using different certification standards do cause some messy phenomena in the certification practices.

In August, 2003, the State Certification and Ratification Regulatory Commission promulgated the Certification Standards for Production and Processing of Organic Products, which was developed on the basis of organic products certification standards by OFDC.

The State Certification and Ratification Regulatory Commission launched the development of the national standards for organic food in second half of 2003. It called upon relevant experts and specialists to discuss the issue on a number of occasions. A set of national standards, which are both international and Chinese, have been shaped. At the moment, more comments on the national standards are being solicited and administrative procedures for certification of organic products are also being drafted.

6. Prospects for Development of Organic Food in China

6.1 Trend of Organic Agriculture Development

6.1.1 Organic agriculture has drawn and will continue drawing on the attention of the governments of different countries. A number of provinces in China have developed and are developing encouraging policies to subsidize development of organic agriculture and organic food, increase investments to promote the development of organic agriculture for the purpose of rural development and protection of eco-environment.
6.1.2 Due to the safety and high quality of organic food, the need for consumption of organic food will be further expanding. Supermarkets and large-scale chain retail industry have been actively involved in selling organic food and the organic food market is growing rapidly.
6.1.3 More emphasis will be placed on organic agriculture. Nowadays, FAO considers organic agriculture as a feasible way for raising food security and bio-diversity and promoting sustainable development. It has listed organic agriculture as one of the sixteen top priority action areas. Local governments and research institutes at various levels have listed organic agriculture and organic food as key priority research projects.
6.1.4 Organic agriculture and organic food market will continue to see unbalanced development. European and American countries will continue dominating organic food consumption and technical barriers in international trade of organic food will exist for a long period of time. While exporting organic food to the European and American markets, the developing nations have started developing domestic markets and will consider domestic markets as the motive force and end-result of developing organic agriculture and organic food. China will be the fourth largest market for the consumption of organic food after the European Union, USA and Japan.

6.2 Prospects for the Development of Organic Agriculture in China

China is a populous country with a vast territory and sound base of traditional agriculture, eco-agriculture and eco-development. But China's agricultural industry faces severe challenges and developing organic agriculture and organic food is a very good entry point. There is a huge market potential and development room. If everything goes well and smoothly, it is expected that, in ten years to come, the market share of organic food in China will reach 0.3~0.5% of the domestic food market, and the export of organic food from China is expected to represent 5.0% of global organic food trade, or even higher. Undoubtedly, developing organic food is a strategic choice for materializing China's sustainable agricultural development.

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ORGANIC AGRICULTURE IN NEPAL: Country Report

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Abstract: In Nepal, agriculture is very complex due to uncertainty of monsoons, soil heterogeneity, fragile mountains terrains with divergent ecosystems, small and fragmented holdings and farmers with poor socio-economic and education base. For the last 8 years, Maoist insurgency, more prominent and expanded throughout the rural areas in Nepal, has further added the deterioration to the already problematic agricultural base of the economy. Besides all these constraints agriculture has remained the dominant economic sector providing employment and livelihood to the majority of the people in the country.

Nepal could not remain outside the domain of Green Revolution technologies and thus, 1960s experienced the introduction of chemical inputs in agriculture system in Nepal. Despite all the efforts of the government with technical, material and financial assistance from the bilateral and multilateral aid agencies, agricultural production is in the process of declining. Reasons could be long listed but more realized and understood factor is the unsystematic use of chemical inputs in agriculture causing not only production decline but ecological deterioration, soil degradation and microbial depletion making the multiple negative impact in the system. At present, agriculture in Nepal is characterized by the diminishing self-sufficiency in food production, economic non-viability, social and ecological unsustainability   This crisis demonstrates the failure of the last four decades of government's planned efforts and related activities in agriculture sector.

Organic agriculture has evolved and emerging as prospective sector of investment for the entrepreneurs in hardware business sector. Besides, there are quite a good number of farmers involved in alternative farming practices and many more are joining after realizing the ill-effects of chemical practices/inputs and good aspects of sustainable practices. More than the market oriented activities in relation to organic farming, it is the general awareness and positive inclination of the farming communities and consumers towards organic practices/products and these are the positive indication for expanding organic agriculture in Nepal in the days ahead. Several organic/microbial products like EM and its technologies are available and being used to support the expansion of Organic agriculture in Nepal. Increased amount of organic products are available in the local markets and few certified products (tea, coffee and herbal products) have already entered into the international organic market chain.

Introduction:

Nepal is situated along the southern slope of Mid Himalayas and located between China and India with an area of 147,181 sq. km. ranging from 60m. to 8848m. above sea level. The country's extremely wide range of physiographic, climatic and ecological variations result in wide diversity of fauna, flora and other natural resources. The country is divided into three main physiographic regions viz. Terai (the plain area), Hill and Mountain which run in more or less parallel bands from north-west to south-east. Poor internal transportation and communication due to extremely rugged topography, deteriorating socio-economic condition and rapidly increasing population factor with its related demand for sustenance are the most important factors influencing ecological deterioration and environmental degradation in Nepal. Maoist insurgency has made the forced deportation of young labor force from the rural areas to the urban centers within the country and even outside the country.

The people of Nepal comprise of many religion and ethnic groups which affect the way in which resources are being used and utilized. More than 42% of the population live below the poverty line and around 50% of the population are still illiterate. The total population is over 25 million (26.289 million in 2005 as reported in Country Data Table by World Watch Institute) of which more than 80% are fully dependent on agriculture sector

Most land holdings in Nepal are fragmented into small plots (50% less than 0.5ha.) and the process of fragmentation is likely to be continued. Available cropland is 0.11 hectare per person in Nepal. Most of the people raise different types of crops and livestock. In order to sustain their livelihood, they are compelled to expand their farms on to margined cultivatable land causing deforestation/landslides and/or to be employed in off-farm activities.

Today, more than any time in its history, there is a dire need for an environment sensitive approach to agricultural development in Nepal. Given the deterioration of ecosystem, the scarcity of fodder and fuel, the loss of soil fertility and its impact on household food and energy security, the approach/es to be promoted must be carefully selected.

Organic/sustainable/regenerative/ecological/nature/alternative/permaculture farming are the different forms/names of farming practices being promoted dominantly through NGOs in Nepal, but still on a smaller and scattered scale. These initiatives are local resource based for regenerating the already deteriorated farming practices and therefore, being accepted by the farming community and slowly being appraised by the professionals which is a positive indication of its increasing impact in the days to come. The influence of worldwide movement in organic production and marketing is contributing significantly to the promotion of organic farming in Nepal, although at a slower pace. For the last few years, the produces (tea, coffee ,herbs and herbal products) of few farms have been certified as organic in Nepal and being marketed in USA, Japan and countries in Europe. More new farms and farming groups are in the process of being certified as organic. Besides tea, coffee and herbal products, organically produced cereals, vegetables and seasonal fruits are also available in the local markets within Nepal.

Background:

The post-war agricultural revolution changed the face of farming in almost every food producing country in the world. Introduction of synthetic fertilizers, pesticides and factory farming of livestock became the symbol of development. There was a desperate need for food in the recovering economies of the 1940's 50's and 60's and farmers everywhere were encouraged to rely increasingly on synthetic inputs and intensive production methods in order to maximize yield and product quality. Nepal was initiated to join this development club in 1960's by the foreign Aid agencies associated in the economic development of Nepal.

In the 21st century, we are already in a second agricultural revolution. The world is now experiencing the problems created by industrial agriculture. Pollution of lakes and rivers, deterioration of soil and environment, loss of biodiversity, decreasing productivity, polluted and poisonous food items as a result of chemical farming are now well documented. There have been a number of food scares associated with chemical agriculture involving bovine spongiform encephalopathy (BSE), pesticides in food, food poisoning (E. coli 0157, Salmonella, Listeria etc.), hormone and antibiotic residues in meat products. The introduction of GM technology raises further potential problems for agriculture including genetic pollution of wild plant populations, damage of beneficial organisms and wildlife and increased dependence on certain pesticides. Questions are also raised regarding the health effects of GM foods on consumers (HRH The Prince of Wales, 1998).

Organic agriculture could provide a solution to many of the problems created by industrialized and chemical agriculture. It is based on a natural system in which all aspects of that system, (the soil, organisms, environment, crops, livestock, farmers and consumers), are considered as part of a holistic unit (Blake, 1994). Organic philosophy recognizes that these aspects will, and must be allowed to interact. Until recently, organic agriculture was practiced by relatively few farmers and organic produce was consumed mainly by environmentalists and green activists. Now, the word "organic" is on everybody's lips. Organic agriculture has matured into a mainstream activity, practiced by thousands, supported by millions worldwide.

The future of organic farming or nature farming has been reviewed and discussed by many scientists. In the organized way, the terminology of Nature Farming was originated in the east (Japan in 1953 by Mokichi Okada) whereas Organic Farming was initiated from the west (Europe in 1970 through IFOAM). Nature farming is more attached to the ground and environment whereas organic farming is its elevated form connecting to the consumers through marketing science and procedures. Nature farming and organic farming should have a bright future because people worldwide have come to realize that they must respect nature and nature's laws in our modern society. If chemical agriculture is allowed to continue as it is, the environment in which we live will be severely threatened. Therefore, it is concluded that organic agriculture has a bright prospect although there are many problems yet to overcome by the practitioners, promoters, consumers and all the concerned.

The Organic Movement

Several factors have contributed to the recent expansion of organic agriculture worldwide. Consumers increasingly want to buy it, but there are number of reasons for this. A survey was carried out by the UK consumer journal "Health Watch" in April 1997. It was found that 83% of organic food consumers bought it because they wanted to avoid pesticides; 75% bought it on the grounds that it was kinder to the environment; 70% were concerned about the intensive rearing of animals; 68% bought it because of the taste; 40% wanted to support local farmers and 36% expressed worries about BSE. A number of other surveys have been carried out yielding similar, through slightly different results (Anon., 1999a). The perception of the benefits is not necessarily accurate, but so long as consumers in increasing numbers continue to perceive these benefits, the organic movement will continue to grow

The growth of the organic movement is due not only to the positive force of increased consumer demand, but also to the depressed state of the conventional/chemical farming sector. Conventional farm incomes in Europe have been so slow, particularly in livestock sector, that many farmers see organic systems as being more profitable option.

In Nepal, organic farming/agriculture was unknown or very little known to few until 1990's. The terminology of Sustainable Agriculture and Permaculture was initiated by INSAN in 1990's whereas Regenerative/Organic Agriculture was introduced and practiced by CWDS from 1991, started after organizing a national workshop in 1991 (October 5-8) in Kathmandu-Nepal. Today, organic movement in Nepal has come to a stage where it is not just limited to few NGOs and individuals but spread to diverse groups/individuals ranging from small farm holders to commercial big farms; from NGO, private to government agencies. Organic farming and organic produce are well known to each and every segment of the population in Nepal but being practiced and consumed by very few because of the ground reality and with valid reasons prevailing in the country.

Organic in Nepal:

Organic agriculture is still in very early stage in Nepal. The negative impact of chemical agriculture is being realized not only by the farmers who have been using it for the last four decades, but also by the policy makers, intellectuals and sensitive citizens after observing the deteriorating situation in agriculture sector. It was expressed for the first time by them during the "National Workshop on Regenerative Agriculture in Nepal" organized by CWDS in 1991 (October 5 to 8) in Kathmandu-Nepal. Continuously increasing price of chemicals (fertilizers, pesticides, fungicides etc.) is another important factor for the farmers to look for the right alternatives in order to sustain the farm productivity which has direct bearing on families sustenance.

Organic agriculture movement is gaining popularity and the programs at the field level are being implemented in different names (regenerative/sustainable/ ecological/natural/permaculture) within Nepal. The common concern is to promote local-resource-base agriculture practices in order to increase the indigenous production potential of soil, crops, plants and animals and decrease the external dependency for farm inputs. The government sector is becoming positive towards sustainable farming methodologies but still not very open as its chemical oriented agriculture programs and manpower development are being supported and financed by chemical prone bilateral/multilateral/government agencies. There are some professional NGOs and individuals committed to the promotion of organic agriculture and therefore, engaged in the activities, may be in small pocket areas as per the available resources and their limited capabilities.

There are some organizations like CWDS, ESC, INSAN and few more NGOs associated with Nepal Permaculture Group (NPG) involved in promoting organic farming through different approaches as few are promoting permaculture concept and others in the name of sustainable/organic agriculture practices. There are few other groups, individuals/entrepreneurs and professionals who are materializing the concept and procedures of organic agriculture in establishing commercial production centers for tea, coffee, herbs and herbal products, fruits and vegetables.

Organically grown products have entered in the local markets in Kathmandu and other urban centers, still in a very limited quantity. But the trend and attraction of the buyers/consumers encourage and initiate the organic agriculture activists to expand the production areas. For the time being, marketing of organic produces mostly vegetables, cereals and some culinary herbs is being done through hotels and organic shops/srotes. Some commercial tea estates are converted and certified as organic and its produces are being exported to the counties in Europe, USA and Japan. Coffee grown in the hills of western region of Nepal is certified as organic and being exported to Japan. Likewise, herbal products and essential oil grown/produced through Sambhala Herbal Products have been certified organic and being exported outside. All the above products certified as organic are very limited in quantity at present.

<u>Certified Farms</u>:

Farms	Area	Export 2003	country
1. Kanchanjangha Tea Estate-Panchthar	95 hec.	13000kg	EU
2. Guranse Tea Estate-Dhankuta	250 hec.	16000kg	EU/Japan
3. Gulmi Dist. Coop. Society Small Coffee growers	75	10000kg	Japan
4. Sambhala Herbal Products and Essential Oil	40	500kg	Germany
5. Natural Resource Industry, Jhapa/Rauthat 80		------	
6. Org. Agri. Industry-Arghakhanchi (coffee, termeric & honey: prospective)			
7. Small area of Turmeric and Ginger in Panchthar			

Besides, the above listed certified organic farms, there are several types of herbs and medicinal plants collected from the forests and these products are wild and organic in true sense, although not yet included in the organic certification list. The area under organic tea is increasing very fast. About 433 hectares of tea gardens of small farmers in Panchthar has been included in organic within the command area of Kanchanjangha Tea Estate. Likewise, small farmers in Illam district are being organized in order to streamline their tea gardens into organic certification domain.

The above listed figures of organic farms and its produces look very small but its impact is very encouraging as there are several new areas (in location and commodity) coming under organic. More than that, it is the general notion and understanding of the entrepreneurs that organic has the potentials of being economically viable. The additional benefits of organic being social and environmental friendly are the bonus attraction making organic sector more lucrative in Nepal. Organic tea gardens in Nepal are in the hills at around 2000 meter altitude. These areas have no better use than growing tea and people living around have no paid job than being employed in tea gardens. Thus organic, specially tea, is compatible both to land and people in Nepal.

In Nepal, tea cultivation was started back in 1863 by establishing a tea estate (Illam Tea Garden) in eastern Nepal. At present, there are several tea plantation areas with 12,643 hectares already under tea cultivation and the total potential area that can be brought under tea is about 20,122 hectares. Total tea export is just about 82 metric ton out of total tea production (8189 metric ton) in Nepal.

Organic agriculture movement in Nepal needs the dedication of the people and organizations concerned for it. As the organic itself is a new concept for the common people in Nepal, It needs quite a lot of efforts in order to make the people more aware of its importance and significance for the long-term sustainability of the farming system in the country. The negative impact of food quality due to the use of chemicals is very little known and understood by few.

Prospect and Potentials:

There is still a great need for like-minded organizations in Nepal to come together and put their efforts collectively in order to give strength to the common concern of local-resource-base agricultural practices ie. Organic Agriculture. Nepal, having the diverse eco-regions, has the comparative advantage in organic agriculture blessed by the Nature. Today, the demand for organic produce is in increasing trend in the local markets, at least in the urban areas mostly to the places where concentration of tourists is high within Nepal. The demand for organic produce is limited and would remain limited in relation to the local consumers because of the poor purchasing capacity of the common people. The city elite could be attracted if appropriate approach is considered in order to make (this group of consumers) aware of the hazardous effect of agricultural products with chemical applications. There is very high potential for vegetables and fruits to catch the market if proper organizational structure in marketing of organic produces is created and brought into action. Once this phase is established, there would be immediate need for proper standardization and certification of organic produces in Nepal. So far nothing or very little has been done in formulating the national standards for organic produces. For the time being, organic movement in Nepal is at its early stage where proper nurturing of organic concept and its dissemination is the primary concern of the individuals/ organizations involved and we are in the same process.

Issues:

Despite international and state sponsored several agricultural projects in Nepal; poverty, food scarcity, malnutrition, health deterioration and environmental degradation continue to be the widespread problems. Although government embraces liberal economic policy after the establishment of multi-party democratic system in 1990; deforestation, landslides, soil erosion, pollution and loss of genetic bio-diversity proceed at an alarming rate and are rarely reflected in the economic indicators. Such failures demonstrate that the conventional development strategies are fundamentally limited in their ability to promote equitable and sustainable development. The on-going Maoist movement in Nepal has further deteriorated the overall situation of law & order, institutions, markets and policy implementation.

Organic agriculture is difficult to be implemented where institutional arrangements, market forces, policies and research efforts are biased against it. Therefore, a major challenge in today's Nepal is to establish law & order situation and create a new policy framework that enhances sustainable agricultural development and conservation efforts through promotion of agro-ecological technologies directed at:

(a) increasing agricultural land and labor productivity to satisfy food needs,
(b) introducing ecological rationality in agriculture to reduce the use of chemical inputs, complement watershed and improve soil conservation programs, plan agriculture according to land use capabilities of each region (ecosystem) and promote efficient use of water, forest, etc., and
(c) coordinating agricultural, environmental and economic polices to account for environmental costs and to provide farmers with incentives to adopt agro-ecological alternatives.

Strategies:

Given the economic crisis and the degree of environmental deterioration in Nepal, government should expand the efforts in local-resource-base sustainable agriculture and promote approaches that fit the needs of the peasants who lack resources. Sustainable rural development implies the search for socio-economic strategies that take into account environmental concerns and the needs of the vast majority of the population, specially the poor.

In case of peasant agriculture in a country like Nepal, the challenge is to develop appropriate low-input agricultural techniques adapted to the needs and circumstances of a vast population of resource-poor farmers. Groups (NGOs and individuals) involved in the implementation of agro-ecological proposals are faced with the need to promote productive alternatives that are not only ecologically sound but also economically viable/profitable.

Conclusion:

Nepal is still in the initial stage of its involvement in organic agriculture but its importance in the total agriculture scenario in the country cannot be under-rated accordingly. Therefore, organic movement in Nepal needs increased functional initiatives of the professionals and policy initiatives from the government sector as well. At present, most or all policy frameworks of the government in Nepal actively encourage agriculture that is dependent on external inputs, technologies and knowledge. Most, if not all, of the policy measures used to support agriculture currently act as powerful disincentives against sustainability. It is high time for the like-minded NGOs and professionals to work together for the promotion of organic agriculture and initiatives towards suitable policy formulation that can help the process of organic production systems, standard setting and certification. The experiences and expertise of IFOAM members in Asia could be of great assistance in this respect. Let us devote a part of our time, talent and efforts for the betterment of global environment in order to save this beautiful PLANET of ours. Through organic agriculture movement, we would be able to contribute significantly not only for the survival of human race but also for the plants, animals and other living beings.

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Organic Farming Style : *Krisoks*+ Perspective and Experiences

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It is painful to start thinking differently comparing to others' around me. It is rather confusing when the same scientist or policy maker saus the opposite about agricultural production process and inputs-he said just a decade earlier. It is same initially to overlook the squeezing eye-brow of the neighbours. It is frustrating to invest to Internet with the hope of breaking the ego of the scientists and policy makers.
But with all the pains-it is the joy that we are proceeding inch by inch towards the goal of forming an Organic Community. Certainly this is not a scientific paper- but the story of continuous struggle of a small "Krisok Samaj(Farming Community)" who are on the way to be Organic. The Presentation will also highlight the motivating strategy, social policy formulation, social certification, consumption and marketing pattern, social policy formulation, social metfodology development, cooperation among various stakeholders(farmer-farmer, farmer-researcher-policy maker). This will also open up a floor of discussion among farmers of different societies, cultures and countries.

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The Status of Organic Agriculture in Palestine

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Introduction

Israeli procedures have turned the Palestinian territories into approximately (300) little prisons separated by roadblocks and checkpoints. Large Palestinian communities have been isolated. Unemployment exceeded 56%; Gross Domestic Product (GDP) dropped by 51%; the total loss of the Palestinian economy reached 13 billion dollars or 69%-the daily rate of loss totaled 6-8 million dollars. Moreover, 87% of Palestinian households suffered loss to their income as a result of the Israeli procedures.
The agricultural sector, a significant tributary to the Palestinian economy employing 15.7% of the Palestinian labor force and contributing to Palestinian steadfastness, came under extensive Israeli policy of destruction; Israeli occupation destroyed homes, agricultural property, infrastructure, uprooted trees, destroyed irrigation systems, killed cattle, confiscated hundreds of thousands of acres. The direct losses to the agricultural sector totaled 1.31 billion dollars in 2003. The Israeli policy of destruction goes on; the Apartheid Wall has been the most prominent of such a destructive policy. The Apartheid Wall has destroyed agricultural land and annexed most of the agricultural lands of the Palestinian territories to Israel. Palestinian farmers have been deprived of their lands and were forced out of their homes so as to become potential cheap laborers for the Israeli labor market and lose their national identity.

The agricultural sector has been the backbone of the Palestinian economy traditionally. In the late sixties the agricultural sector contributed 37% to the GDP. This contribution declined in the eighties to 18%, and this trend continued, to reach 7% in 2001. Despite the poor contribution of the agricultural sector to the GDP and the domination of small familial units in the sector, it absorbs more than 29% of employment. Many factors have contributed directly to the decrease of the agricultural sector's contribution to GDP among these:

1. The Israeli strategy of land expropriation for settlements; Israel has confiscated around 60% of the Palestinian land in the West Bank and 40% in Gaza through various military orders.
2. Controlling of water resources.
3. Israeli products flood the markets.
4. The high remuneration of employment in Israel compared with the agricultural sector.
5. The rapid growth in the services sector.

The agricultural sector still plays an important role in providing 90% of white meat, 91% of vegetables, 61 % of milk, 35% of red meat and 35% of cereals for domestic consumption. The most important agricultural exports are olives, olive oil, vegetables, fruits and flowers. The contribution of agricultural exports accounts for 23% of total Palestinian commodity exports.

The agricultural sector has been severely affected by the Israeli army attacks on the Palestinian territories and economy. Since the beginning of the second Intifada in September 2000 until August 2002, it is estimated that the Israeli army and settlers destroyed 169 water wells, 663 pools and water stores and demolished 8646 dunums of irrigation networks. The Israeli forces uprooted 675,830 olive and fruit trees of which 193,315 are olive trees. They confiscated 1,162.4 dunums of land and bulldozed or burned 14,339 dunums of land.

There have been many problems and obstacles encountered by the farmers in the agricultural practices and marketing They have been prevented from reaching their fields by the Israeli army and settlers, villagers have been threatened while working in their fields and they fear direct attacks from the settlers when working in their fields; in many cases they were shot while picking their olives.

According to the Ministry of Agriculture the total direct losses in the agricultural sector from Sept. 29 2000 to September 30 2002 reached $776,277,798. The problems that the agricultural sector suffers from can be summarized as follows: Israeli closure, scarcity of water resources, lack of access to markets and the restrictive trade regime, the extremely high protective tariffs on agricultural raw materials, inadequate domestic policies for securing food supplies, land confiscation and restrictions, weak agricultural institutions, market constraints, lack of infrastructure and lack of planning and coordination.

Olive is the major crop in the cultivated areas of the West Bank, constituting up to 25% of the gross agricultural income. According to the statistics of 2002, olive trees cover about 881,000 dunums with a total production of about 153,000 tons of olives. Moreover, there is an increase in the olive-cultivated area with an annual average of 2000 – 3000 dunums (MOA 2001; PCBS 2002, PFU 2003). Most of the mountainous areas in the West Bank are not suited for any other agricultural activity except the growing of olive trees. These trees are native to the region, surviving and thriving on the rocky soil found throughout the region. Olive trees are also environmentally friendly. They have a low water demand and are rarely irrigated. That is a major advantage especially in light of the sever water scarcity in the region. The olive trees also reduce soil erosion during the rainy season by providing cover for parched soils, lessening the impact of raindrops on fragile soils, and therefore one of the leading defenders against desertification. Olive production provides the bulk of income for about 71,000 farmers' families distributed over the different governorates of the West Bank. Most of the olive yield (up to 95%) is used for the production of olive oil, and the rest is used for olive pickles. The supply of olive oil reached 35,800 tons in October 2002, of which 4,000 tons were stored from previous years. The average total local consumption is about 12,500 tons per year, and the residual (surplus) olive oil reached 23,300 tons (PFU 2003). This amount, in case well produced and marketed, would have provided about US$ 70-90 million to a large number of mostly marginalized olive growers' families.

The farmers face many obstacles in the production process; farmers are threatened and attacked by the settlers and the Israeli forces while picking up their olives. In many villages settlers stole the olives and in other cases they burned the land. In one example, a village in the West Bank called Qeffm lost around 40% of its agricultural land which is mainly planted with olives. This land has been confiscated by the Israeli forces for building the Separation Wall.

Local market and problems of marketing

Marketing strategies of organic and non organic products in Palestine are still traditional and suffer from the internal and external constraints imposed by the Israelis. The continuous closure and siege imposed on the Palestinian territories narrowed the local market for the organic and the non organic agricultural products and this created the need for opening up new markets for agricultural products. The most traditional marketing channels which have been used to distribute the agricultural products for the local market are the following: Central markets, semi central markets, wholesalers and retailers, agricultural cooperatives and direct customers. A very important character of the exports is that 95.2% of the exports are to the Israeli market, and the exports to the international markets are negligible due to many constraints including the absence of a body that can focus on finding marketing channels abroad. Now Al Reef Company is playing this role while it facing in the moments constrains from Israel policy I Palestine.

In general, there used to be for main channels for the marketing of the Palestinian organic products. Example: marketing of organic olive oil. These are:

1) The local market, which was and still is the main consumer of olive oil, where the average total consumption of olive oil is estimated at present to be around 12,500 tons.

2) The Arab markets: Until recently, the Arab markets of the neighboring countries like Jordan and the Gulf States constituted the main channel for the excessive production, where in average 8000–10,000 tons per year used to be exported. However, the export to these countries has significantly decreased in the past years to reach only 2500 tons at present.

3) International markets: Serious attempts were made to look for international markets for the Palestinian olive oil. The Italian government signed a contract with the Cooperative Union in the late eighties to buy 6000 tons of olive oil with fair prices. The local cooperatives then started buying oil from the local market on behalf of the Cooperatives Union, which was the official party to implement the deal. The export process however faced obstacles after the delivering the first shipment, since the specifications of the olive oil were lower than the required standards. It is worth mentioning that further attempts were made to open new markets for olive oil in Europe where the oil is filled in high quality half liters bottles. The quantity exported in 2001 and 2002 reached 50 tons.

4) The Israeli market: It is estimated that the quantities of Palestinian olive oil exported to Israel; mostly to the Palestinians living there, range from 1000 to 1500 tons per year. However, the quantities exported to Israel had declined in the past two years of Intifada to reach only 700 tons in 2002. Table 1 is showing an estimation of the marketed quantities of safe product in the local markets in Palestine. While table 2 showing Marketed Natural Products in the last year in the international market (Europe and the Arab Countries), 2003/2004.

Table 1: Estimated Marketed Natural Products in the last year in the local market, 2003-2004:

Crop Type	Quantity/ Kg	Area of Production	Area of Marketing
Vegetables	40, 000	Jenin	West Bank
Olive oil	50,000	Jenin	West Bank
Vegetables	25,000	Hebron	West Bank
Fruits	30,000	Hebron	West Bank
Vegetables	50,000	Jericho	West Bank
Date Palm	25,000	Jericho	West Bank

Table 2: Marketed Natural Products in the last year in the international market, 2003/2004:

Crop Type	Quantity/ Kg	Area of Production	Area of Marketing
Dates	40, 000	Jericho	Europe
Qusqos	30,000	Gaza	Local and International
Almond	20,000	Jenin	Local
Olive oil	30,000	Rammalh and Qalqilya	Europe and Arab countries

Local Marketing at Hebron

This is started in 1997. PARC team chose 10 farmers and trained them how to produce safe food. The farmer's joint in several training courses like introduction into organic agriculture, organic farm management, improvement and production of local seed, IPM and ICM without using chemicals or pesticides. Moreover the farmers also got extension services weekly in the fields. In 2001 PARC started with marketing the organic products in Hebron, 2 days weekly and they still ongoing working with this activity until today even the abnormal political situation in the city. The farmers sell their products in PARC office each Mondays and Thursdays and the rest of products they sell it through special Market in the afternoon time. They sell mainly organic vegetables and fruits in this market.

Local Market in Jenin

The dry land farming system is widespread in Palestine. The inputs and the outputs in such kind of agriculture are less then in intensive agriculture. Because of that PARC team start to train the farmers to produce save production in order to protect the human health and the environment. This farmers group with the help and support of PARC they start using the compost and the alternatives for the chemicals and using the improved local seed for their farms. In fact these farms became organic farms but they didn't have organic farm certificates, because until that time we didn't have the body for Inspection and certification of the organic farms in Palestine. The idea is spread in the region, a lot of consumers start contacting these farmers and buying the products with higher price then the non organic or the non safe product. Because the consumers them selves are accepting the organic production than the non organic products. The farmers in Jenin area are producing mainly organic vegetables, Olive oil, and Wheat.

Local Market in Jericho

This market starts last year to marketplace the production from the pilot farm of PARC in Jericho. The extension agent starts contacting the consumer in their work through private visit and brochures. The farmers start offering their production directly near their farms writing that this is organic products. The farmer success with their trail and the consumer paid 10% more than the current price for the organic production. After that the consumers start to have a direct contact with the farmers through telephone calls to reserve their quantities. The main problem facing this area is finding such kind of products around the year. Some times there was an excess in the production, PARC help the farmers to market it in Ramallah. The main products were marketed at Jericho Medical Plants, Date palm and Vegetables.

Inspection and Certification

Until 2003 there was no body for inspection and certification for the organic agriculture. PARC start working hardly in the field of organic agriculture where they got fund from the Italian Ministry of Foreign Affair for the project “Introduction of organic farming in Palestine”. One of the main objectives of this project was to build a body for inspection and certification of organic farms. PARC team was trained this year in the Center of Organic Agriculture in Egypt (COAE), and PARC got the official use of the logo of this Center until they will establish the Center of organic agriculture in Palestine next year. Implemented Committee by the project (composed by PARC and the Ministry of Agriculture) working to fix the international standards to apply to Palestinian organic farming products, according to the European Commission and the IFOAM standards, in order to allow their export

Local seeds and the Future of Organic Seeds Production in Palestine:

The distinguished experience of the agricultural guides at PARC in enhancing and producing local seeds as well as the fact that farmers were happy with the distinctive features of the new seeds, led to the continuation of the program of broadening the quantity and the quality of the improved local seeds in 2003; PARC supervised the entire phases of production and enhancement of local seeds using the following activities: It has been noticed that the areas planted with improved local seeds are less than those of last year due to current situation of this type of work. The total area planted with local seeds was 215 acres in 2002; however, in 2003 the area was reduced to 25 acres only. Moreover, there is an obvious shortage in the number of plants produced from improved local seeds, which were given to farmers. However, farmers expressed satisfaction regarding the quality and importance of the improved local seeds; a center for packing improved local seeds was also established at al Zababdi Center where a bank for the seeds established in 2004.
Since the last year the local seeds farm are under conversion, where it's expected to get the certification for the produced organic seeds in the year 2006. Because the traditional agriculture in Palestine without using chemical or pesticides and if it's used only in small quantities.

Products, marketing and consumers.

Through the Project "Introduction of organic farming in Palestine" we are providing the following:

- Implement several information campaigns for the consumers, through brochures and TV advertising, in order to promote the purchase of organic farming production.
- Involved "key elements" of the Palestinian society (social, political and economic) in supporting organic farming.
- Organising and equip three market/shops for organic farming, in order to sell the production and spread the knowledge about it. These shops (about 200 square meters each) will be rented in Nablus, Bethlehem and Ramallah.

Encourage farmers to apply sustainable agricultural techniques and marketing of safe agricultural products:

The team of extension workers and developers of the Agronomists Department was able to carry out a number of activities within the timeframe of the 2003 annual plan, which emphasized support and assistance of Palestinian farmers to follow sound and environmentally friendly agricultural practices following internationally recognized methods.
A number of organic agricultural patterns were introduced and the safe agricultural products were marketed. Also, information about the organic agricultural products and PARC's experience in this field were published on the regional and international levels. The Department worked hard to carry out the activities facing different challenges and obstacles, which face the agricultural sector, concentrating on the sustainable development and development of human resources and building of technical and specialized centers in service of the Palestinian farmers. The activities succeeded in encouraging farmers to apply sustainable environmental methods and techniques; the number of farmers practicing organic farming and those who practice integrated pest-management reached more than 600 on an area of approximately 175 acres. Moreover, 25 practical models of new agricultural practices were introduced to the program in addition to training 20 leading farmers on organic agriculture through a number of workshops and publishing an advanced training material in organic agriculture and another material on enhancing local seeds. The material was broadcast on local radio stations to get across to the largest possible number of farmers.

Status of organic agriculture in Palestine

Activities

The activities are carried by PARC in the field of organic agriculture are

1. Realisation of Training courses for agricultural extensionists on organic farming techniques and methodology.
2. Realisation of Training courses for "key" farmers.
3. Establishment of a Committee of producers (100 members).

4. Implementation of three pilot farms for training courses and "on the job" training. Opening of three shops for organic farming products.
5. Certification for organic farming products based on international standards.
6. Establishment of a Supporting Committee for the introduction of organic farming.
7. Re-conversion of 100 farms to organic farming.
8. Realisation of a research on sustainable agriculture in the Arab world.

Description of activities

1. Training courses for agricultural extensionists on organic farming.
Three training courses held one per year for a total of 60 agronomists and agricultural extensionists. The courses centred on a theoretic and on the job training program, concerning land re-conversion and organic farming production. The courses will take place in the pilot farms at Jenin, Jericho and Gaza. At the end of each course, there is an examination and a certificate of "Organic Farming Extensionist" awarded.
Beneficiaries of the training courses agronomists and extensionists of PARC or other NGOs, or other interested farmers associations

2. Realisation of Training courses for "key" farmers
These training courses (15 in total) take place on a six-month period base, three each six-months for five times. Each course will take place every two months. Each course will be attended by 30 people (men and Women), for a total of 3000 people. The program mostly realised in the pilot farms. Each course last one week

3. Establishment of a Committee of producers.
A Committee of producers (100 members, one third of the beneficiaries of the "key farmers" training course) were established.

4. Implementation of three pilot farms for training courses and "on the job" training.
Three organic farming pilot farms implemented and used as location for training courses. The farms located in Jericho, Jenin and Gaza and equipped. Land will be rent for ten years by farmers and the farms "productive centers", with nurseries and greenhouses. In addition, farms will be stations for biological struggle against parasites and for research on natural fertilizing methods, such as compost and others.

5. Opening of three shops for organic farming products.
Three shops for the promotion and selling of organic farming products coming from pilot farms and reconverted farms will be opened. The shops (+/-200 square meters) will be rented in Nablus, Bethlehem and Ramallah and equipped with the necessary furniture and equipment.

6. Certification for organic farming products based on international standards.
The project will implement a Committee (composed by PARC and the Ministry of Agriculture) in order to fix the international standards to apply to Palestinian organic farming products, according to the European Commission and the IFOAM standards, in order to allow their export.

7. Establishment of a Supporting Committee for the introduction of organic farming.
A Supporting Committee, composed by 1500 people, established. The Committee spread and promote organic farming as an added value for environment protection and people health. In addition, the Committee act as promoter for new laws connected at the organic farming production.

8. Re-conversion of 100 farms to organic farming.
The project applied the realisation of 100 organic farming productive units (farms), re-converted from traditional farming.

9. Realization of a research on sustainable agriculture in the Arab world
A research for the analysis and the evaluation of the recent training programs on extension activities in organic farming realized, together with a research on organic farming and technical development in the sector.

Case study: The Project “Introduction of organic farming in Palestine”

Beneficiaries
This project involved several sectors of the Palestinian society: producers, to improve the “competition” on the market; traders, to offer a new kind of products; consumers, as regards their health. But the most important beneficiary was the agricultural “world”, in order to assure to farmers, choosing organic farming, a best income generation.

The project mostly located in pluvial areas, because in these areas is concentrated the majority of poor farmers, owing to the scarce productivity of land, the difficulties in obtaining credits and the lack of resources to be invested in inputs for agriculture. The second priority will be the Gaza and Jericho regions, where small-scale producers are concentrated. Organic farming will improve soil fertility and renewable resources, through absence of chemical inputs.

Special attentions were devoted to women, who encouraged cultivating domestic orchards, in order to improve food quality and to assure an income generation. Training organised in groups, 20 people each, and 50% will be women. The selection of beneficiaries based on economic and social criteria, following PARC experience in the last years: first of all, the ownership of the land (with priority to farmers who base their income generation on farming). This project was discussed with farmers’ representatives, following the PARC Strategic plan on Agriculture (1998/2001), and answering to several consumers “point out” about food quality in Palestine.

Overall Objective

Overall objective of the Project is the introduction in Palestine of the production of organic farming products, obtained through the improvement, development and organisation of organic farming techniques in the area. In addition, the Project aims to “open” the local and international market of this kind of products. The Project will promote a close link with Italian “structures” involved in organic farming production and trade. An added value of the project will be the “struggle” against rural unemployment, soil erosion, and desertification.

Immediate Objectives

The process following these immediate objectives:

- to protect and improve soil fertility in the long term;
- to implement renewable farming systems based on local resources;
- to promote the creation of Farmers Associations of organic farming;
- to promote the breeding of local races;
- to preserve genetic variation in the farming system;
- to "open" an organic farming products market, domestic and international.
- to promote the adoption of a regulation on organic farming in the country.
- to build a body for inspection and certification of the organic farms.

Implementation of the Project

Methodologies

The Project implement an integrated structure in order to deal with every subject related to organic farming, from land re conversion to production and trade:
a) Implementation of three pilot farms (where training courses located).
b) Extensionists and "key" farmers (women and men) training; follow up and selection of the trained for local upgrading.
c) Definition of a Statute and a Mission for the Organic Farming Producers Committee.
d) Standards of certification for organic farming and social legislation
e) Products marketing and consumers.
f) Institutional support.

a) Implementation of three pilot farms (where training courses will be located).
The Project foresees the implementation of three pilot stations (farms) of organic farming, to be used as location for the training courses (on the job training). The stations will be in Jericho, Jenin and Gaza. Land will be the contribution of farmers to the Project (for a period of ten years), together with the needed water for irrigation. The farms will be equipped with nurseries and greenhouses. In the farms, in addition to the training courses, compost production will be implemented.

b) Extensionists and "key" farmers (women and men) training; follow up and selection of the trained for local upgrading.
Workshops and training courses implemented as follows:
Organisation and implementation of two different trainings: one for the extensionists (agronomists) and one for "key" farmers (women and men), on the following subjects:
a) Soil preparation for the re-conversion of farms to organic farming;
b) Production of compost and other natural fertilizers;
c) Choice of the best seeds;
d) Research and specification of plant diseases in Palestine;
e) Preparation of natural remedies;
f) Biologic "fight";

g) Re-conversion of breeding techniques.

As regards the beneficiaries, farmers, PARC extensionists, other NGOs extensionists and farmers association members, were selected for the courses. The project cooperates with Research Centres and Institutions based in countries where the organic farming is still developed. Experts will assure consulting on product preservation, packaging, and marketing, definition of the standards for product certification, environmental protection, and re-conversion to organic farming.

c) Definition of a Statute and a Mission for the Organic Farming Producers Committee.
The Project foresees the creation of an Organic Farming Producers Committee in order to improve the spread and the knowledge of this farming system. This Association (100 members at least) will define a "mission" and a working program. The Committee will also supply the necessary services for the certification of organic farming production. During the period of re-conversion from traditional farming to organic farming, farmers lose their income; so the project foresees to support them through "in cash" subsidies (100 farmers, with 5 dunums of land each. The subsidy is Lit. 260.000 For each dunum, for a total of Lit. 130.000.000).

d) Standards of certification for organic farming and social legislation.
The Project create a Committee (composed by PARC and the Ministry of Agriculture), in order to assess the international standards to be applied to Palestinian production, following the European Union and the IFOAM standards. This allow the marketing (export) of products. Once settled the standards, a Certification Committee will manage the official certification of the organic farming production.

e) Products marketing and consumers.
The Project provides the following:
Implement several information campaigns for the consumers, through brochures and TV advertising, in order to promote the purchase of organic farming production.
Involved "key elements" of the Palestinian society (social, political and economic) in supporting organic farming.
Organising and equip three market/shops for organic farming, in order to sell the production and spread the knowledge about it. These shops (about 200 square meters each) will be rented in Nablus, Bethlehem and Ramallah.

f) Institutional support.
A supporting Committee (1.500 people and 20 farmers associations and NGOs) will be created. The Committee will play an essential role in convincing farmers and consumers of the importance of organic farming. In addition the committee will "lobby" for the issuing of regulations on organic farming and production marketing.

Conclusion:

The above-mentioned program encouraged farmers to use sustainable environmental techniques; the number of farmers using these techniques reached 550 farmers cultivating 2,000 dunum of land. Twenty new applications were also introduced to the program. In addition to the above, 14 farmer leaders were trained in organic farming techniques.

Current and Expected results:

1) 3 training courses (one each year) implemented and 60 extensionists, (PARC and others NGO's) trained.
2) 15 training courses (3 each six months) implemented. 300 farmers, men and women, trained.
3) A farmers Committee (minimum 100 farmers) installed.
4) Three pilot farms (Jenin, Jericho and Gaza, with a minimum extension of 1.5 ha. Each) installed and operating.
5) Three shops (+/- 200 m²) in Ramallah, Bethlehem and Nablus financed by the selling of products opened and functioning; domestic and international trade of organic farming products operating.
6) Quality certification for products (international standards).
7) A Supporting Committee for the introduction of organic farming established.
8) 100 farms reconverted to organic farming.
9) A research on sustainable agriculture in the Arab world implemented; publication of the research; one seminary to spread the result of the project realised.

Labelling:


eerste koude persing • première pression à froid
'Virgin' olijfolie
Huile d'olive vierge
زيت زيتون بكر
Convient aux préparations chaudes et froides
Voor koude en warme bereidingen
Oxfam
75 cl
Fair Trade
'Virgin' olijfolie زيت زيتون بكر
Huile d'olive vierge
Deze olie wordt geperst uit olijven van de Westelijke Jordaanoever. Olijven zijn een belangrijke inkomstenbron voor de kleine Palestijnse boeren van onze partner PARC. Dankzij PARC kunnen de boeren samen verkoopskanalen vinden en samen meststoffen, zaden en landbouwmateriaal aankopen. De verwerking van olijven zorgt voor bijkomende tewerkstelling en draagt bij tot de opbouw van een onafhankelijke, Palestijnse economie. De economie van Palestina moet opboksen tegen heel wat hindernissen, zoals hoge invoertaksen om producten in de Europese Unie te kunnen verkopen. Oxfam-Wereldwinkels klaagt deze onrechtvaardige handelspolitiek van Europa scherp aan.
Bij koele bewaring kunnen zich kristallen vormen. Ze verdwijnen op kamertemperatuur.
Cette huile provient d'olives récoltées sur la rive ouest du Jourdain. Les olives constituent une importante source de revenus pour les petits cultivateurs palestiniens de PARC. Grâce à cette organisation, ils regroupent leurs achats de semences, d'engrais et de matériel agricole. De plus, par ce biais, le produit de leurs récoltes est écoulé sur le marché et de nouveaux débouchés sont constamment recherchés. Cette activité de transformation de la production agricole est pourvoyeuse d'emplois supplémentaires et participe à la construction d'une économie palestinienne indépendante. L'économie palestinienne est confrontée d'ailleurs à nombre de difficultés. Par exemple, elle doit s'acquitter d'importantes taxes à l'importation pour accéder au marché de l'Union européenne. Les Magasins du monde-OXFAM dénoncent fermement cette politique commerciale européenne injuste.
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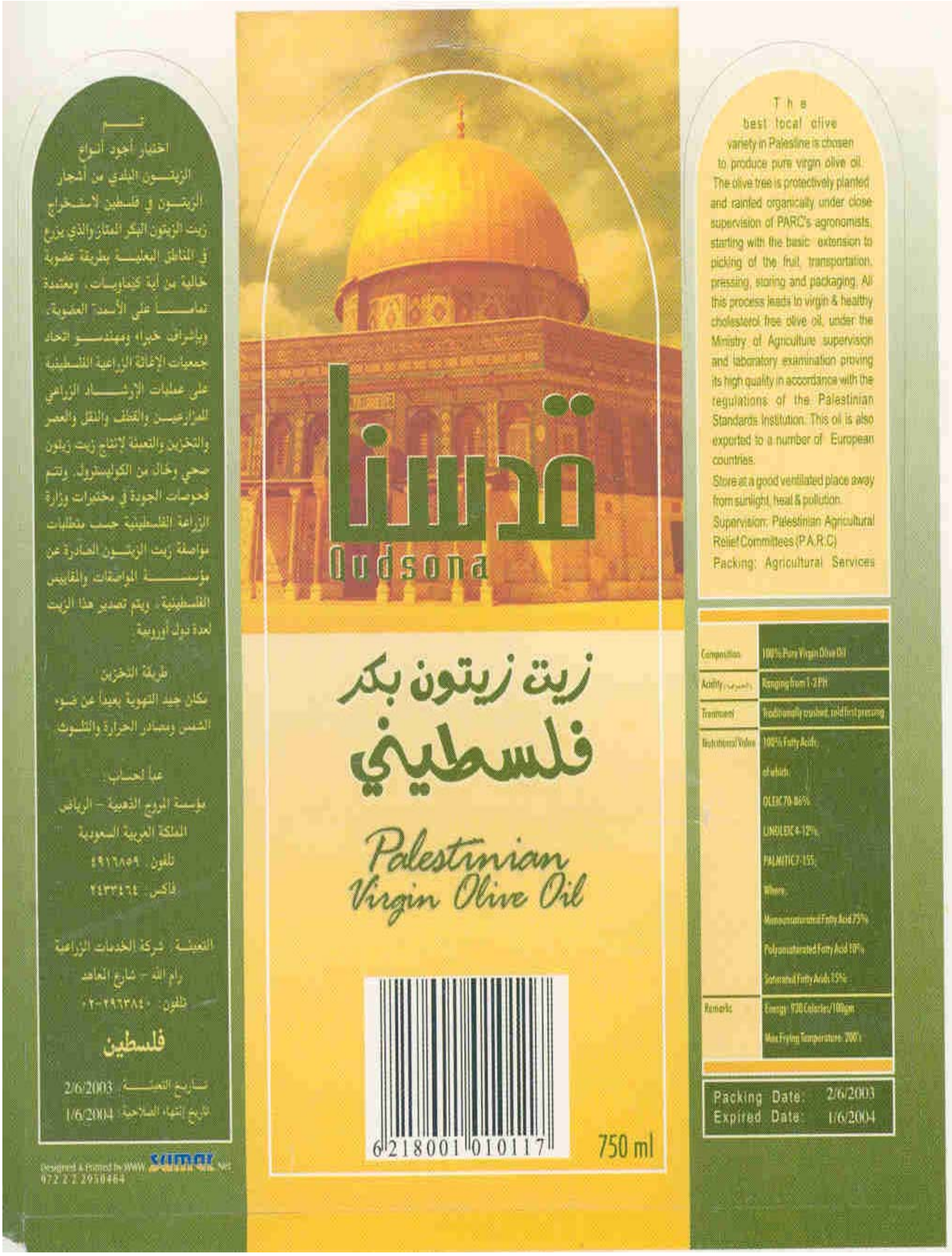
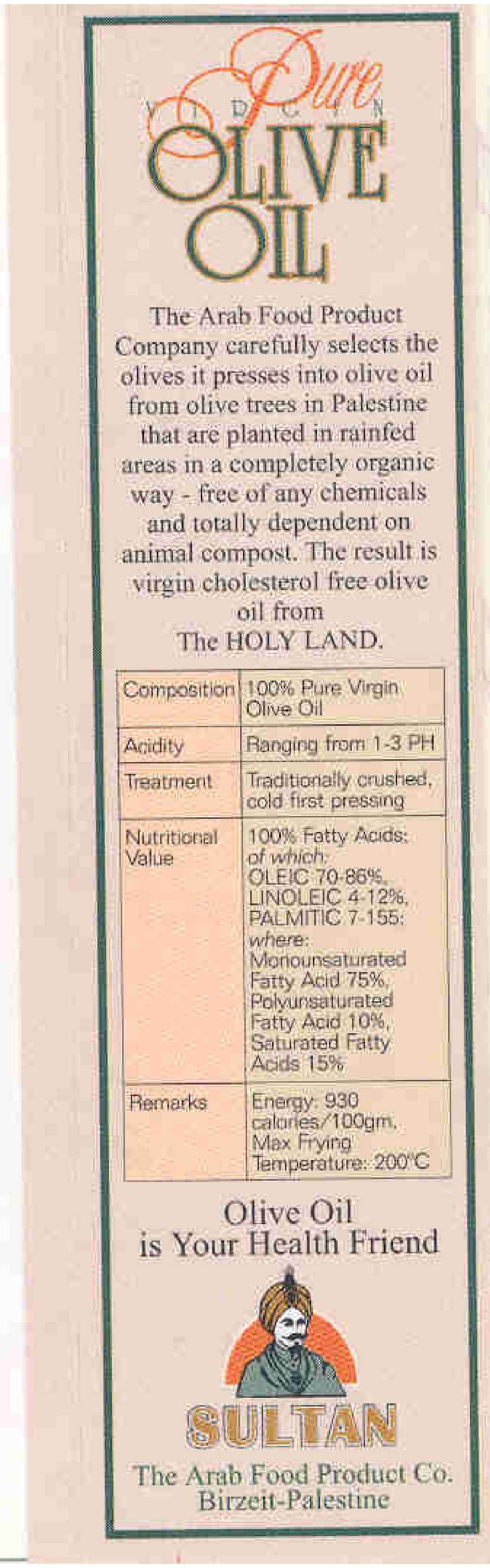
Extra Virgin Olive Oil
Product of the Holy Land إنتاج الأراضي المقدسة
Volume: 750 ml الحجم: ٧٥٠ مل
Bottled by Al-Reef Real Estate LTD.co تعبأة شركة الريف العقارية
Ramallah - Palestinian Authority Areas رام الله ـ مناطق السلطة الفلسطينية
Tel:2963840 / Fax:2963850 تلفون: ٠٢-٢٩٦٣٨٤٠ / فاكس: ٠٢-٢٩٦٣٨٥٠
Under the supervision of the Palestinian Agricultural Relief committees (P.A.R.C)


تم
اختيار أجود أنواع
الزيتون البلدي من أشجار
الزيتون في فلسطين لاستخراج
زيت الزيتون البكر الممتاز والذي يزرع
في المناطق البعلية بطريقة عضوية
خالية من أية كيماويات، ومعتمدة
تماما على الأسمدة العضوية،
وبإشراف خبراء ومهندسو اتحاد
جمعيات الإغاثة الزراعية الفلسطينية
على عمليات الإرشاد الزراعي
للمزارعين والقطف والنقل والعصر
والتخزين والتعبئة لإنتاج زيت زيتون
صحي وخال من الكولسترول، وتتم
فحوصات الجودة في مختبرات وزارة
الزراعة الفلسطينية حسب متطلبات
مواصفة زيت الزيتون الصادرة عن
مؤسسة المواصفات والمقاييس
الفلسطينية، ويتم تصدير هذا الزيت
لعدة دول أوروبية
طريقة التخزين
مكان جيد التهوية بعيداً عن ضوء
الشمس ومصادر الحرارة والتلوث
فلسطين
2/6/2003
1/6/2004
قدسنا
Qudsona
زيت زيتون بكر
فلسطيني
Palestinian
Virgin Olive Oil
6 218001 010117
750 ml
The best local olive variety in Palestine is chosen to produce pure virgin olive oil. The olive tree is protectively planted and rainfed organically under close supervision of PARC's agronomists, starting with the basic extension to picking of the fruit, transportation, pressing, storing and packaging. All this process leads to virgin & healthy cholesterol free olive oil, under the Ministry of Agriculture supervision and laboratory examination proving its high quality in accordance with the regulations of the Palestinian Standards Institution. This oil is also exported to a number of European countries.
Store at a good ventilated place away from sunlight, heat & pollution.
Supervision: Palestinian Agricultural Relief Committees (P.A.R.C)
Packing: Agricultural Services
Composition
100% Pure Virgin Olive Oil
Acidity
Ranging from 1-2 PH
Treatment
Traditionally crushed, cold first pressing
Nutritional Value
100% Fatty Acids,
of which:
OLEIC 70-86%
LINOLEIC 4-12%
PALMITIC 7-155,
Where,
Monounsaturated Fatty Acid 75%
Polyunsaturated Fatty Acid 10%
Saturated Fatty Acids 15%
Remarks
Energy: 930 Calories/100gm
Max Frying Temperature: 200°c
Packing Date: 2/6/2003
Expired Date: 1/6/2004


زيت زيتون بكر
صافي ١٠٠%
تقوم الشركة العربية للمنتجات الغذائية بإختيار الزيتون الذي تعصره الى زيت زيتون من أشجار الزيتون في فلسطين والذي يُزرع في المناطق البعلية بطريقة عضوية – خالية من أي كيماويات ومعتمدة تماما على مُخلفات الحيوانات. والنتيجة زيت زيتون خال من أي كوليسترول ومن
إنتاج الأراضي المقدسة
Composition: 100% Pure Virgin Olive Oil
Acidity: Ranging from 1-3 PH
Treatment: Traditionally crushed, cold first pressing
Nutritional Value: 100% Fatty Acids; of which: OLEIC 70-86%, LINOLEIC 4-12%, PALMITIC 7-155; where: Monounsaturated Fatty Acid 75%, Polyunsaturated Fatty Acid 10%, Saturated Fatty Acids 15%
Remarks: Energy: 930 calories/100gm, Max Frying Temperature: 200°C
زيت الزيتون
صديق صحتك
سلطان
الشركة العربية للمنتوجات الغذائية
بيرزيت–فلسطين


Pure
VIRGIN
OLIVE OIL
The Arab Food Product Company carefully selects the olives it presses into olive oil from olive trees in Palestine that are planted in rainfed areas in a completely organic way - free of any chemicals and totally dependent on animal compost. The result is virgin cholesterol free olive oil from
The HOLY LAND.
Composition: 100% Pure Virgin Olive Oil
Acidity: Ranging from 1-3 PH
Treatment: Traditionally crushed, cold first pressing
Nutritional Value: 100% Fatty Acids; of which: OLEIC 70-86%, LINOLEIC 4-12%, PALMITIC 7-155; where: Monounsaturated Fatty Acid 75%, Polyunsaturated Fatty Acid 10%, Saturated Fatty Acids 15%
Remarks: Energy: 930 calories/100gm, Max Frying Temperature: 200°C
Olive Oil
is Your Health Friend
SULTAN
The Arab Food Product Co.
Birzeit-Palestine


زيت زيتون بكر
فلسطيني
صافي 100%
تم اختيار اجود انواع الزيتون البلدي من اشجار الزيتون في فلسطين لاستخراج زيت الزيتون البكر الممتاز والذي يزرع في المناطق البعلية بطريقة عضوية خالية من اية كيماويات، ومعتمدة تماماً على الأسمدة العضوية، وبإشراف خبراء ومهندسو اتحاد جمعيات الإغاثة الزراعية الفلسطينية على عمليات الإرشاد الزراعي للمزارعين والقطف والنقل والعصر والتخزين والتعبئة لإنتاج زيت زيتون صحي وخال من الكوليسترول. وتتم فحوصات الجودة في مختبرات وزارة الزراعة الفلسطينية حسب متطلبات مواصفة زيت الزيتون الصادرة عن مؤسسة المواصفات والمقاييس الفلسطينية، ويتم تصدير هذا الزيت لعدة دول اوروبية.
Composion | 100%pure virgin oil
Acidity (الحموضة) | ranging from 1-2 ph
Treatment | traditionally crushed, cold first pressing
Nutritional Value | 100% fatty acids; of which: OLEIC 70-86% LINOLEIC 4-12% PALMITIC 7-155; where: Monounsaturated fatty acid 75% Polyunsaturated fatty acid 10% Saturated fatty acids 15%
Remarks | energy: 930 calories/100gm Max frying temperature: 200° C
زيت الزيتون
صديق صحتك
طريقة التخزين: مكان جيد التهوية بعيداً عن ضوء الشمس ومصادر الحرارة والتلوث.
إشراف: اتحاد جمعيات الإغاثة الزراعية الفلسطينية
التعبئة: شركة الخدمات الزراعية. رام الله – شارع المعاهد. تلفون 02-2963840 فلسطين.


Olive Oil Is Your Health Friend
Palestinian Virgin Olive Oil
The best local olive variety in Palestine is chosen to produce pure virgin olive oil. The olive tree is protectively planted and rainfed organically under close supervision of PARC's agronomists, starting with the basic extension to picking of the fruit, transportation, pressing, storing and packaging. All this process leads to virgin & healthy cholesterol free olive oil, under the Ministry of Agriculture supervision and laboratory examination proving its high quality in accordance with the regulations of the Palestinian Standards Institution. This oil is also exported to a number of European countries.
Store at a good ventilated place away from sunlight, heat & pollution.
Supervision: Palestinian Agricultural Relief Committees (P.A.R.C)
Packing: Agricultural Services Company Ramallah, Al-M'ahed St. Tel. 02-2963840
Palestine
Composition
100% Pure Virgin Olive Oil
Acidity
Ranging from 1-2 PH
Treatment
Traditionally crushed, cold first pressing
Nutritional Value
100% Fatty Acids;
of which:
OLEIC 70-86%
LINOLEIC 4-12%,
PALMITIC 7-155;
Where:
Monounsaturated Fatty Acid 75%
Polyunsaturated Fatty Acid 10%
Saturated Fatty Acids 15%
Energy: 930 Calories/100gm
Remarks
Max Frying Temperature: 200°c
قدسنا
Qudsona

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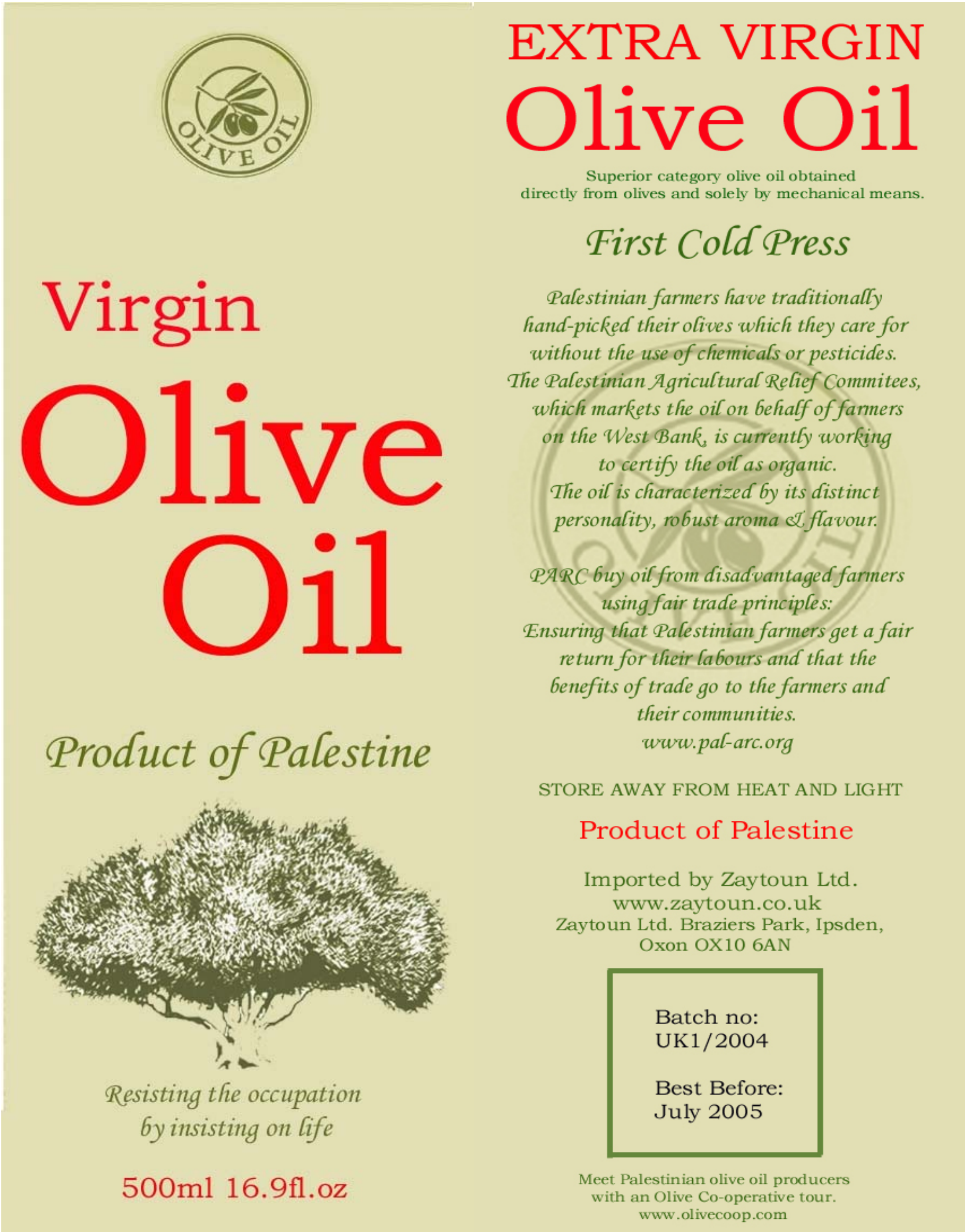
OLIVE OIL
Virgin
Olive
Oil
Product of Palestine
Resisting the occupation
by insisting on life
500ml 16.9fl.oz
EXTRA VIRGIN
Olive Oil
Superior category olive oil obtained
directly from olives and solely by mechanical means.
First Cold Press
Palestinian farmers have traditionally
hand-picked their olives which they care for
without the use of chemicals or pesticides.
The Palestinian Agricultural Relief Commitees,
which markets the oil on behalf of farmers
on the West Bank, is currently working
to certify the oil as organic.
The oil is characterized by its distinct
personality, robust aroma & flavour.
PARC buy oil from disadvantaged farmers
using fair trade principles:
Ensuring that Palestinian farmers get a fair
return for their labours and that the
benefits of trade go to the farmers and
their communities.
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Meet Palestinian olive oil producers
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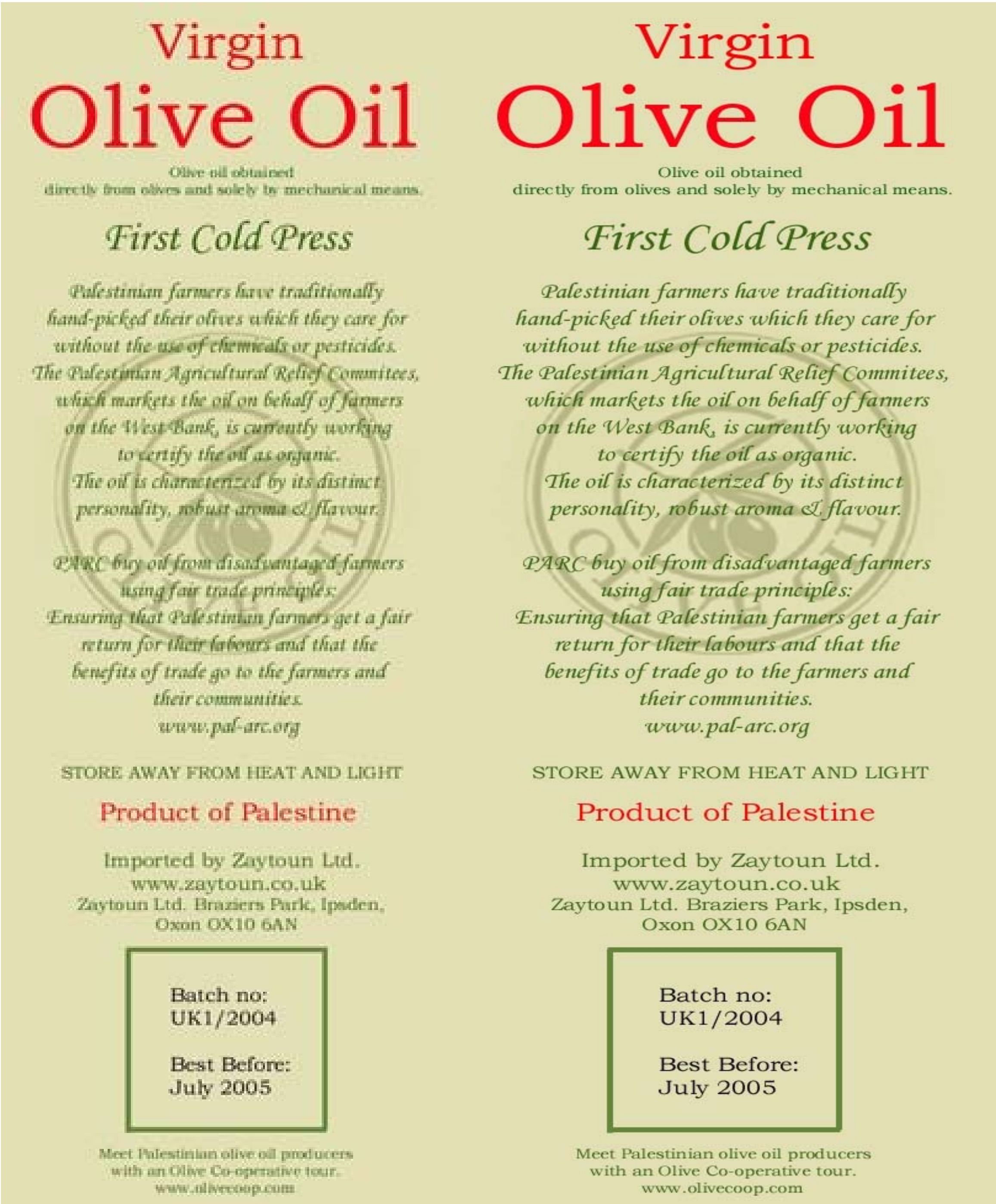
Virgin
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6th IFOAM-Asia Scientific Conference
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7th – 11th September 2004. Yangpyung / Korea

Country report: The Current Status and Prospect of Environmentally Sound Farming in Korea

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Abstract : Recently it was developed not only a huge demand in market for organic food, but also people want to keep clean drinking water and protect soil from chemical fertilizer and agro-chemicals. Government promote organic farming preparing Environmentally Friendly Agriculture division in the MAF, establishment of “Agriculture and Forest Policy for 21C”, enactment of Law on Upbringing Environmentally Friendly Agriculture, and declaration of "the first year of environmentally sound agriculture". In the paper, the government policy for organic farming was introduced, including 1) supporting and upbringing farmers practicing environmentally sound agriculture, 2) activating the circulation structure in which consumer and producer cooperate, and 3) emphasizing the environmentally sound agriculture as a way of coexistence. NACF has been playing the major role for the implementation of organic farming. Its major activities include 1) directing the production and distribution of environmentally sound agro-products, 2) finding out problems and measures on distribution of organic products. Outline of certification system, procedure and current activities of quality certification were also shortly introduced.

Key words: Education, Implementation, Policy, Certification, Environmentally sound agriculture, Organic farming, Korea

Government Policy for Organic Farming

In order to develop environment friendly agriculture, Korean government has promoted its preparing basis for upbringing environmental agriculture including institution of environment friendly agriculture division in the Ministry of Agriculture and Forestry (MAF) in December 1994, establishment of “Agriculture and Forest Policy for 21C” in July 1996, enactment of Law on Upbringing Environmental Agriculture in December 1997, and declaration of "the first year of environmentally sound agriculture" in November 1998.

Governmental policy for environmentally sound agriculture could be roughly divided into 4 directions. First, Government proceeds to reduce pollution sources as agricultural chemicals, fertilizer, stockbreeding excretions generated from agricultural practice, second, to maintain and improve an environmentally sound agricultural bases such as soil and water quality, third, to support farmers practicing environmentally sound agriculture, and finally, to establish circulation structure in which consumers and producers cooperate.

Korean government (MAF) is supporting farmers implementing an organic farming for early expansion and establishment of environmentally sound agriculture. Undertaking, supporting and upbringing farmers implementing environmentally sound agriculture include 『Undertaking of preparing environmentally sound family agricultural complex』, 『Undertaking of preparing environmental agriculture zone』, 『Undertaking of preparing environmentally sound agriculture direct payment system』, and 『Undertaking of preparing environmentally sound agriculture model farm』.

So far, MAF has realized the expansion of environmentally sound agricultural bases by supporting integral facilities and equipments necessary for maintenance and preservation of agricultural environment of local unit and production of safe farming products, but there exists some problems like when selecting undertaking zone, preliminary inspection was unsatisfactory for local agricultural condition or technological level for environmentally sound agriculture, and individual producing facilities are preferred rather than investment for improvement of agriculture environment.

To expand the outlet of organic agricultural products, MAF tries to allow consumers to buy environmentally sound agricultural products with ease and trust most of all.

MAF is supporting cooperation between grower and consumer to build up mutual confidences between consumers and producers through meetings on-the-spot of environmentally sound agriculture, and will induce civil associations to drive this undertaking to be settle down.

And MAF plan to amend the Law on Upbringing Environmental Agriculture in order to enlarge consumptions on the basis of raising trust on environmentally sound agricultural products and prepare for expansion of international exchange through harmony with international standards as Codex alimentarius guideline by unifying the certificate system of organic products, for it is bifurcated into the indication reporting system of environmentally sound agricultural products under the Law on Agriculture Upbringing and quality certification pursuant to the Law on Quality Management of Agricultural and Marine Products, which can confuse the consumers.

80 specialized sales corners are installed and operated for easy purchase in supermarkets of the Agricultural cooperative association and Hanaro Mart, and environment friendly agricultural products specialized sales corners is planned to be expanded continuously (up to 200 stores) by 2004. Also environmentally friendly agricultural products corner is linked in agricultural products integrated shopping mail (www.asim.or.kr) for e-sales of environmentally sound agricultural products, and we subsidize the construction for cyber-market of producers association.

In order to solve the shortage of funds required by the environmentally friendly agriculture association to circulate agricultural products, we enlarged the purchasing fund of environment friendly agricultural products to USD 11.2 million every year, and included environmentally sound rice which have been excluded from supporting.

Besides the above, MAF has planned to enhance advertisement using mass media to expand outlet of environmentally friendly agricultural products, and to expand urban-suburban exchange connecting producers and consumers, to conduct various training, etc.

The ultimate goal of environmentally sound agriculture promoted by Government is simultaneous pursuing of economical efficiency of agriculture, preservation of agricultural environment, and safeties of agricultural products.

Accordingly, MAF is planning to uplifting environmentally friendly agriculture which accords with the basic direction of agricultural policy of expanding food security bases by not only making use of public utility function as flood control or soil preservation, but also minimizing environmental pollution and considering productivity increase like soil improvement.

2. Implementation of Organic Farming by NACF (National Agricultural Cooperative Federation) and NGOs

The main programs for organic farming conducted by NACF are listed as below. NACF is directing the production and distribution of organic food to promote the organic agriculture.

Tab1. The main programs for organic farming conducted by NACF & NGOs

Class	Main Contents
Supporting & Directing the production	○ Upbringing producer group of environmentally sound agro-products ○ Promoting joint research program about environmentally sound agriculture (Agrarian Improvement Center) ○ Upbringing environmentally sound agriculture in Paldang watershed area
	○ Promoting "Soil Reviving Movement" - Providing Soil inspector (A-PEN) and fertilization recommendation - Providing environment preserving manure and soil improver - Promoting the movement of making green field
Distribution Support	○ Creating distribution of environmentally sound agro-products - Holding the Expo of environmentally sound agro- products - field trip to production spot inviting urban consumers
	○ Managing stores for organic agricultural products - sales agency: 7, Organic corner: 45 ○ Promoting e-commerce of environmentally sound agro-products ○ Constructing distribution system of environmentally sound agro-products
Training, Advertise-ment	○ Special technique training course on environmentally sound agriculture ○ Training and advertisement for expanding recognition of environmentally sound agro-products ○ Environment education of Consumers' Association - Opening lecture on Thursday

NACF tries to organize the Produce Body for organic farming; In 2000 there were 2,101 farmer’s group, but they are eager to have 3,200 in year of 2004. For metropolitan area such as Kyunggi, Incheon, Seoul province it is targeted to organize the organic farmer’s group to concentrate the leafy vegetables and organic livestock, but for Middle area such as Kangwon, Chungchong, Chunbuk province, it is focused to grow the organic fruits, vegetables and rear organic livestock, for Youngnam, Honam area including Chunnam,Kyungbuk, kyungnam, Cheju province, it is recommended to organize farmer’s group to cultivate the organic fruits and rear organic livestock.

For Continuous Promotion of Soil Reviving Movement, all of NACF participated soil inspection with manure prescription program, issuing fertilization recommendation using the result of soil testing.

The circulative characteristics of organic products are originated from 1) high distribution cost expended due to small, various kinds and small packaging, 2)marketability decline comparing to other agricultural products, 3)sales driven by direct dealing around life cooperative associations, 4)consumers' complaints on organic products.

“People imagine an organic food is expensive” could be eliminated by the factors of the rise in price in the course of production, packaging, distribution of organic products. NACF try to upbringing the organic farmer’s group, distributing an organic food, developing massive direct dealing partner, which not requiring small package (school or hospitals), and eliminating factors of the rise in price in distribution with custom sales for members.

“People imagine an organic food is unbelievable” since mass media reported that agricultural chemicals are found in environmental agricultural products. But NAPQMS(National Agricultural Products Quality Management Services) implemented quality certification from 1993, Government guarantees an organic food, prescribes minimum standard of residue for agro-chemicals, and offers the mind training to organic farmers.

“People imagine buying an organic food is inconvenient” since major department stores offered an organic food and custom sales for members only system (direct marketing) offered an organic food. But at the moment the NACF install organic food sales agency and organic food corner, furthermore a lots of organic food corners are installed in large shopping center including Hanaro Club of NACF.

Several schemes were launched to activate the distribution of organic products, meeting the consumer’s need and improving the organic farmer’s income. It was scheduled that increasing sales corners (108 corners in 2000 to 206 corners in 2004) and the volume (USD 6.4 million in 2000 to USD 32 million in 2004).

Opening Expo of environmentally friendly agricultural products was held in Nov. 2000 (4 days 3 nights) to exhibit the certified products and ESAA (Environmentally Sound Agriculture Association) guaranteed products. The main program of the Expo has included exhibition, special sales, and tasting parties of environmentally sound agro-products.

Field trip to environmentally sound agro-products inviting urban consumers is initiated by NACF and NGOs, in order to promote consumers' understanding of environmentally sound agriculture and to establish mutual confidence. The public opinion leading layer of a big city, consumers of environmentally sound agro-products were invited to the advanced farmhouse implementing environmentally sound agriculture, common composting facility, sales agency, or organic food corner.

In order to find out the wholesale and mass consumers such as large enterprises, public offices, or school lunch programs for environmentally sound agro-products, consuming the environmentally sound agro-products at least once a week. NACF also take liaison with the food service industry to find restaurant with organic food.

Inducing the purchase organizing by consumers' association, several concepts were developed, such as 1) induction the members of consumers' association to be purchasing members of environmentally sound agro-products, 2)for each person who purchased organic food, granting member's code by group or person, 3)when they purchase an environmentally sound agro-products at store/ via internet or by phone, pay to their consumers' association deducting fee at a

certain rate.
For the promotion of the organic food purchasing, it is grouped in 5 different types; 1st type: promoting cooperative buying of environment friendly agricultural products - confidence building stage, 2nd type: custom sales to consumers' association, the NACF member (Seoul), 3rd type: constructing distribution system including life cooperative Federation, WOMENLINK, 4th type: constructing cyber market of environment friendly agricultural products. Besides for the convenience of the consumers, it was tried to make even the small groups by association, i.e. Apartment complex, the Federation of Housewives, etc.

Promoting an export of environmentally sound agro-products was another way to expand organic food consumption; there is activity to grope an export scheme responding demand of environment friendly agricultural products of Japan, and to promote affirmatively an export of organic products centering pioneer farmhouse.

The eating movement of environmentally sound agro-products will be continuously implemented by designating a certain day (i.e. Thursday), starting with large enterprises of sisterhood relationship and expanding to public authorities.

Educational policy is, first of all, required to allow children to intake less environment hormone by changing school lunch to environment friendly agricultural products. Therefore, school lunch program has to change at first. And lunch programs of public authorities, organizations or large hospital are given priority in changing (i.e., once a week).

In reality, when a lunch program buys agricultural products of ingredients, there are problems in selecting supplier by a competitive bid. For price is preferred to quality, chief ingredients are indiscriminately supplied without respect to the production center, cultivating method or distribution, unless it breaches least standard of residual heavy metal or agricultural chemicals.
Organic products in the market are a staggering price comparing to others because of its producing quantity and distribution structure. Particularly, environmental agricultural products selling from department stores become a factor of high distributing cost by small packaging. However, environmental agricultural products can be supplied at a price a little higher than general agricultural products if we utilize mass distribution of lunch program and circulation system of nonprofit institutions as the NACF.

In order to change lunch programs' ingredients to environmental agricultural products, there need to be recognition shift of mass consumers as school and consents. Environmental agricultural products are not available anytime apart from industrial products or other general agricultural products.
For starters, we need to purchase produced environmental agricultural products, and, for the long run, to construct production and consumption system through cultivation contract with the NACF and NGOs. Consumers' encouragement and purchase allow producers to produce high-quality and safe agricultural products continuously.

3. Certification System for Organic Products

The purpose of quality certification is to produce and supply high quality and safe products, to heighten competitive power of our agricultural product, to build up trust on safe agricultural product by certification in accordance with production condition, and establish supply system of agricultural product suitable to consumers' taste.
Implementing quality certification agricultural product cultivated by organic and non-agricultural chemicals was introduced in December 1993 and quality certification for processed goods of agricultural product organically cultivated was implemented in November 1998.

Center for Quality Certification could be the managing center of quality certification (NAPQMS) and producers' association designated as quality and safety certification institute. 109 agricultural commodities and 4 livestock products proclaimed by the MAF could be the certification objects.

Certification standards by Items are such as locality, name of kind, year of production, rank, ingredients, contents and production method (i.e. organic, non-agricultural chemicals, low-agricultural chemicals).

For certification standards by producing condition, there are 3 common items. First, cultivating soil should not contain the soil pollutants below the standard for farmland of “soil pollution precaution standards” under the Article 19 of enforcement decree of the Law on Preservation of Soil Environment, and the content of organic matter should be more than 3% except paddy rice field. Second, cultivating water whether it originated from rivers, lakes or marshes, should meet as prescribed by the article 2 of enforcement decree of the Law on Basic Environmental Policy, adequate to “standard of protection of human health”, and over 2nd grade of water source water under the standard of living environment. However, as to rice, over "agricultural water" under the standard of living environment prescribed by the article 2 of enforcement decree of the Law on Basic Environmental Policy. Subterranean Water should be over "agricultural water" under the article 6 of enforcement decree of the Law on Preserving the Subterranean water Quality. Third, for the packaging there should be no possibility of pollution around the packaging, and in case pollutants are expected to scatter from customary package, at least 8m buffer-distance is maintained.

In order to be certified as organic food, an organic products should be cultivated in a farm in which soil is managed by crop rotation or input of manure, the farming method in which fertilizer or organic synthetic compound is not used at all should be implemented for more than 3 years. Second, organic commodities should be not to process with radiation in the course of production, harvesting, processing, storage, packaging and circulation, and not to use poisonous or harmful material. Third, residual agro-chemicals are not permitted. But, in case of force major like scatter out of farm of customary agriculture, it shall be below a-tenth of the standard for permission of residual agricultural chemicals proclaimed by the Minister of Health and Welfare under subsection 1 of the article 7 of the Law on Food Sanitation.

For the agro-products of non-agricultural chemicals method, soil should be managed by crop rotation or input of organic manure, and no organic compound is used at all, the amount of fertilizer used shall be in compliance with recommendation of Agricultural Research and Extension Service. Commodities should be not to process with radiation in the course of production, harvesting, processing, storage, packaging and circulation, and not to use poisonous or harmful material. Residue of agricultural chemicals is not permitted. But, in case of force major like scatter out of farm of customary agriculture, it shall be below a-tenth of the standard for permission of residual agricultural chemicals proclaimed by the Minister of Health and Welfare under subsection 1 of the article 7 of the Law on Food Sanitation.

For the commodities of low agricultural chemicals method, the amount of fertilizer used shall be in compliance with recommendation of Rural Development Administration. In cultivation, spraying frequency of organic compound agricultural chemicals shall be below half of safe usage standard under the subsection 2 of the article 23 of the Law on Managing Agro-chemicals, organic compound agricultural chemicals may be used 30 days prior to first harvest of each product. Residual agricultural chemicals shall be below half of the standard for permission of residual agricultural chemicals proclaimed by the Minister of Health and Welfare under subsection 1 of the article 7 of the Law on Food Sanitation.

For the livestock products, livestock should be reared to comply with rank standard and non medication period and not to dose fatting medicine or egg-laying facilitator; Hanwoo beef : over 2nd grade of meat as a result of slaughter rank judgment, pork : over B rank as a result of slaughter rank judgment, chicken : over 0.7kg of slaughter weight, 0.3kg for meat or samgyetang, pasturing fertilized egg : over 1.1㎡ pasturing area per head, mixed breeding of a cock per 15 head of hen, over 85% fertilization rate, fertilized egg : free-breeding within restricted place, less than 20 head per 3.3m2, mixed breeding of a cock per 15 head of hen, over 85% fertilization rate.

The effective period of quality certification is expired in 1 year, and after expiration, expansion or continuous certification is applicable.

For the certification, farmers should apply by the specific crop items in case of vegetables and fruits, but the annual crops may be applicable until 42 days prior to sowing. Required documents for certification examination including application form, plan of production, recommendation of quality certification (Organic or non-agricultural chemicals method) issued by organic farmer's association shall be attached. The Certification fee should be paid at the time of application (USD 25/case), in case an organic farmer applies more than 2 applications, the additional fee reduced at USD 25 for each additional application.

After farmer submits the certification application, certification body examined Examining circumstances of location, general, production, quality management such as soil of farm and the water quality.

Table 2: The current status of government's direct payment (unit: $)

Classification	Level of certification	Payment by goverment	Payment by city and province	Support by city and county	Total
Rice- paddy (per ha)	low- pesticide certification	400	640	240	1,280
	non- pesticide certification	520	800	320	1,640
	organic certification	616	960	320	1,896
Dry field (per ha)	low- pesticide certification	419	640	240	1,299
	non- pesticide certification	539	800	320	1,659
	organic certification	636	960	320	1,915

Table 3 : The Current Status of Pro-environmental Produce of Certified

(30th June, 04)

Classification	organic	organic in transition	non-pesticide	low-pesticide	Total
certified farmhouses	1,452	1,297	7,426	13,127	23,302

Talbe 4 : The Certification Standard of Pro-environmental Produce

Classification	Certification Standard
Low- pesticide Cultivated	1. Pesticide: using below 1/2 of National safety standard - safety period applied double(ex: 4 days before harvest - 8 days) 2.C.F: using below 1/3 of package recommendation by RDA 3. Complete prohibition on artificial growth method 4. Residue pesticide: below 1/2 of permitted limit of residue pesticide performed by Food & Drug Administration 5. keeping farming diary longer than one year
Non- pesticide Cultivated	1. Pesticide: complete prohibition on organic compound fertilizer - spreading ecological, physical, microbial and natural goods. 2. C.F: using below 1/4 of recommended by RDA 3. Residue pesticide: using 1/20 of permitted limit of residue pesticide (considering pollution by arsenic acid of farm and agricultural water) 4. Keeping farming diary longer than two years.
Organically Cultivated in Transition	1. Longer than one year after changing into non- pesticide and non- chemical fertilizer (4 years for perennial fruit trees) 2. Keeping farming diary longer than two years.
Organically Cultivated	1. Produce which are raised with non- pesticide and non- chemical for longer than one year 2. Extermination of vermin: spreading ecological, physical, microbial and natural goods. 3. Keeping farming diary longer than 3 years 4. Residue pesticide: the same as non- pesticide raising

Table 5 :The Selling Status of Pro- environmental Produce

(31. Dec.2003)

Classification	rice and cereal	vegetables	fruits	others	Total
selling amount ($ million)	129.2	190.0	48.4	30.4	398.0
portion rate (%)	32	48	12	8	100

Table 6: The Cutback Result of Using C.F and Prediction

Year	'90	'95	'99	'02	'05
amount of using chemical fertilizer (unit: 1,000 ton)	1,104	954	842	706	589
using amount per hectare (kg)	420	409	398	338	281
cutback rate in contrary to 1990 (%)	0	14.6	23.8	36.1	46.6

Table 7: The Cutback Result of Using Pesticide and Prediction

Year	'90	'99	'00	'02	'05
amount of using pesticide (unit: 1,000 ton)	28.7	25.8	26.1	25.8	18.1
using amount per hectare (kg)	13.6	12.2	12.4	12.4	8.5
cutback rate in contrary to 1990 (%)	0	10.3	9.8	9.8	37

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7. Environmentally Sound Farming Products and Marketing, Dan Kook University, Cheonan,

6th IFOAM-Asia Scientific Conference
"Benign Environment and Safe Food"
7th – 11th September 2004. Yangpyung / Korea

The Modern Technique for Organic Rice Cultivation in Korea

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ABSTRACT : For organic rice cultivation, green manure crop and legum should be applied for the improvement of soil fertility by complete cropping system. Livestock manure can be used as a source material for compost if necessary. Cropping system with short season rice variety and paddy-upland rotation system is strongly recommended. Resistant rice variety and cultural control methods are available for control of disease and insect pests. Ecological weed control such as tillage, water management, seeding rate and transplanting management, and biological weed control can be applied. Most of weeds in rice paddy are controlled as it was covered with barley straw or paper.

Introduction

Many countries of the world are concerned with solving the environmental pollution problem caused by industrial development, increase in population, and rise in the standard of living. Modern techniques in agriculture have been developed to address the problems of starvation, low income, and food insecurity among others. Modern agriculture caused environmental stress such as soil erosion, salt accumulation, and contamination of ground water. Despite modern technology's improvement of agricultural production, it has played a detrimental role in the environment.

Organic farming, which is responsible for material circulation in agricultural ecosystem and enhanced crop production with a minimal environmental load with keeping ecological balance, has a crucial part in ecological production and management system.

Since the final Guidelines of CODEX has been formulated in Canada in May 1999, many countries of the world have established their own basic rules of organic farming in relation with the implementation of CODEX Guidelines. Korea has also established and announced officially the environment-friendly agriculture promotion law in 1997. Furthermore, Korea has developed environment-friendly agricultural techniques nationwide and has put to practical use of these farming techniques.

Since the CODEX Guidelines is an international standard for food production all over the world, agricultural products, which are not produced on the basis of these guidelines, can not be commercialized and labeled as organic products. Therefore, specific agricultural techniques for the production of organic livestock and food should be developed and applied in Korea on the basis of CODEX Guidelines.

Codex Guidelines are mostly based on upland farming in Europe. However, it will be reported in this paper that the present technical condition and the corresponding plan for the rice production in paddy farming, which could meet the requirements of CODEX Guidelines, is related to modern agricultural techniques in Korea.

Variety selection

There are approximately 110 varieties, which are registered in Korea with good quality, super high yielding, special quality, and glutinous among others. The requirement for the rice variety selection in organic farming is to select tolerant variety with resistance against insect and diseases. Organic rice seed can be produced by self-production in organic farmhouse. In this case, it is forbidden to harvest the seed in the field where diseases have spread. Tables 1 and 2 show rice varieties with resistance against insect pest, disease, and disasters. The tables show Japonica varieties with resistance against white leaf blight disease and virus and with low temperature germination-ability and cold resistance.

Seed sterilization

Seeds are sterilized with modified hot water treatment after selection of seeds in saline water, which are harvested in disease free field. For example, harvested rice seeds are soaked in cold water for 24 hours and in warm water at 45°C for 2 minutes and thereafter in hot water at 52°C for 10 minutes by turns. Finally seeds are cooled in cold water. It is not a complete sterilization method but it has been used as simple seed sterilization method.

Table 1. Resistance against insect and disease in rice varieties

Variety	Cultivar	Breeding year	Blast disease		Leaf blight disease			Virus disease	Brown Plant hopper
			Leaf	Neck	K_1	K_2	K_3		
Japonica type	JinHeung	1962	MS*	MS	S	S	S	S	S
	NakDong	1975	S	MS	S	S	S	MR	S
	SeomJin	1982	M	MR	R	S	S	MR	S
	PalGong	1986	M	MR	S	S	MS	R	S
	HwaCheong	1986	MR	MR	R	S	S	MR	MR
	HwaYoung	1991	M	MR	R	R	R	R	S
Tong-Il type	TongIl	1971	M	MS	R	MR	S	R	S
	MilYang 23	1976	M	MS	S	S	S	R	S
	MilYang 30	1977	MR	M	R	MR	S	R	R
	TaeBaek	1979	R	R	MR	MR	MR	R	S
	SamKang	1982	MR	R	R	MR	MR	R	R
	NamYoung	1986	MR	R	R	R	R	R	S
	AnDa	1998	R	R	R	R	S	R	R

* S: susceptible MS: moderate susceptible M: Moderate
MR: Moderate resistance R: Resistance

Seedling production

The key point for seedling production is to protect the seedling

Table 2. Rice varieties with disaster resistance by plant breeding

Variety	Cultivar	Breeding year	Low temperature germination –ability	Cold resistance			Lodging resistance
				Chilling injury of seedling	Delay of heading	Fertility stress	
Japonica type	JinHeung	1962	R	R	R	M	MS
	NakDong	1975	R	R	MR	MS	MS
	SamNam	1981	R	R	MR	R	R
	OhDae	1982	R	R	MR	MR	M
	AnJung	1991	R	R	R	R	R
Tong-Il type	TongIl	1971	M	S	S	S	R
	MilYang 23	1976	M	S	MS	S	R
	PungSan	1980	MR	MS	M	M	R
	SamKang	1982	M	S	MR	M	MR

* S: susceptible MS: moderate susceptible M: Moderate
MR: Moderate resistance R: Resistance

from chilling injury and disease damage. Chilling injury can be avoided easily by selecting a chilling resistant variety. However, disease damage can be so serious that it could result in total disruption of annual crop production. Diseases, which frequently occur during growing seedling, are damping-off, sallowed seedling, and seedling rot disease, etc. For control of these diseases, a nursery box should be used after washing and drying completely the boxes.
Soil pH is also important to prevent seedling from diseases because damping-off and sallowed seedling can easily attack the plant soil with high pH condition. To keep optimal pH, natural sulfur powder can be applied with the as amount of 55-80g per box. In addition diatomaceous earth and red earth soil can be used as disease control agents.
Seedling rot disease can be spread frequently in direct sowing cultivation. Therefore, early sowing should be avoided. Water should be drained in the rice field until seedling emergence, and the field should be irrigated shallowly if necessary. Furthermore, sprouting should be done and the use of poorly decomposed compost should be avoided for disease control.

Paddy field Management – in soil fertility management aspect

1) Application of green manure crop

O Hairy vetch
In organic farming, green manure crop and legume should be applied for the improvement of soil fertility by complete cropping system. Table 3 shows the effect of application of hairy vetch as green manure crop in the rice yield. The rice yield was increased with the application of hairy

vetch, and 20t ha^{-1} application of hairy vetch resulted in the highest harvest index for rice. Therefore, hairy vetch can be considered a very useful green manure crop in Korea.

Table 3. Rice yield depending on the application of hairy vetch as green manure crop.

Hairy vetch application (kg FW 10a^{-1})	Ear number (m^2)$^{-1}$	Grain number ear^{-1}	Thousand grain weight (g)	Rice yield (kg 10a^{-1})	Harvest index
1500	420	86.8	21.8	568	99
2000	427	81.1	21.0	587	102
2500	444	79.6	21.0	581	101
Conventional practice *	364	88.0	21.3	576	100

* N fertilizer was applied with amount of 11kg N 10a $^{-1}$ for conventional practice.

O Milk vetch
Milk vetch is mostly used in southern area in Korea due to overwintering problem. It is reported that milk vetch contains approximately 2.25% of nitrogen, and much amount of N can be available for rice plant immediately after application of milk vetch to the rice field. As shown in Table 4, suitable application rate of milk vetch was 200t ha$^{-1.}$ and it was equivalent to that of 110kg ha N application.
Table 5 showed the changes in soil chemical properties after milk vetch application compared to those of rice straw and chemical fertilizer application. Organic matter and P content had similar level in milk vetch application compared to those of chemical fertilization. NH_4-N content increased in milk vetch application compared to that of chemical fertilization in growing period.

Table 4. Rice yield depending on the application of milk vetch as green manure crop

N application (kg ha^{-1})	Milk vetch application (t ha^{-1})				
	100	150	200	250	300
0	427	481	506	501	467
110	505	503	472	412	322

Table 5. Chemical properties of rice paddy soil after application of milk vetch

Treatment	NH_4-N (mg kg $^{-1}$)				OM (%)	P (mg kg $^{-1}$)
	14 days after transplanting	Maximal tillering stage	Heading stage	Harvest stage		
No nitrogen	15.2	16.0	15.4	10.6	-	-
Milk vetch (2.4t 10a^{-1})	29.6	89.4	60.2	47.3	2.7	93
Rice straw (0.5t 10a^{-1})	8.7	24.5	20.5	17.6	-	-
Conventional practice *	16.8	57.5	34.6	28.6	2.2	88

* Fertilization rate for the conventional practice:
N-P_2O_5-K_2O = 11-7-8 kg 10a $^{-1}$

2) Application of compost

O Livestock manure

Livestock manure is mostly used as a source material for manufacturing compost. Cattle manure is specially used for the self compost production in organic farming on a small scale. Application of fresh livestock manure could damage crop production frequently, and the use of fresh livestock manure is avoided for vegetables with prerequisites for keep cleanliness of edible part. Tables 6 and 7 show rice yield and the change in soil chemical properties by application of cattle manure.

Table 6. Effect of application of fresh cattle manure on rice yield.

Treatment		Yield ($t\ ha^{-1}$)		No. of Spikelet $Panicle^{-1}$	Straw ($t\ ha^{-1}$)
		Un-hulled rice	Index		
Chemical fertilizer ($120\ kg\ ha^{-1}$)		6.21	100	96	6.02
Cattle manure	$10t\ ha^{-1}$	5.34	86	89	5.05
	$30t\ ha^{-1}$	5.84	94	95	5.35
	$60t\ ha^{-1}$	6.66	107	99	6.33

Table 7. Chemical properties of rice paddy soil after the application of fresh cattle manure.

Fresh cattle manure ($t\ ha^{-1}$)	PH (1:5)	OM ($g\ kg^{-1}$)	Av. P_2O_5 ($mg\ kg^{-1}$)	Ex. Cation ($cmol^+\ kg^{-1}$)			Av. SiO_2 ($mg\ kg^{-1}$)
				K	Ca	Mg	
10	6.5	25	109	0.65	9.5	1.8	142
30	6.5	26	114	0.78	9.8	2.1	132
60	6.5	26	121	0.72	9.3	2.2	139

O Compost

Table 8 shows the changes in soil chemical properties and rice yield by compost application in long-term rice cultivation. Rice yield was increased by compost application during cultivation period compared to those of chemical fertilizer application. In addition, soil organic matter content was high while P content was low in compost application compared to those of NPK application. Therefore, for the maintenance of soil fertility, compost application was found beneficial and this effect was observed more clearly with cultivation period.

Table 8. Effect of compost application on the yield and soil chemical properties in long-term rice cultivation.

Cultivation Item / Year	Treatment	1971 (5th year)	1976 (10th year)	1981 (15th year)	1986 (20th year)	1991 (25th year)	1996 (30th year)	2001 (35th year)
Yield (kg $10a^{-1}$)	No fertilizer	319	271	369	343	386	327	303
	Compost	370	280	421	436	528	614	523
	NPK	546	452	472	564	605	655	625
	No nitrogen	360	308	384	374	498	424	498
PH (1:5)	No fertilizer	-	5.53	5.42	5.37	5.50	5.20	5.19
	Compost	-	5.50	5.52	5.47	5.70	5.30	5.40
	NPK	-	5.30	5.56	5.73	5.70	5.30	5.54
	No nitrogen	-	5.26	5.58	5.61	5.70	5.40	5.03
OM (%)	No fertilizer	-	2.60	2.26	3.64	3.10	2.80	3.03
	Compost	-	3.80	2.46	3.98	3.40	3.40	3.30
	NPK	-	3.40	2.25	3.58	3.00	2.90	3.02
	No nitrogen	-	3.00	2.25	3.46	2.80	2.80	2.64
P_2O5 (mg kg^{-1})	No fertilizer	-	61	49	35	48	35	16
	Compost	-	87	51	40	68	58	80
	NPK	-	124	95	91	94	132	135
	No nitrogen	-	128	107	90	114	160	199

O Rice straw

Organic matter is an important factor for achieving high soil. Rice straw has the same nutrients acquired from the paddy soil cultivated with rice. Therefore, it will be helpful to restore the rice straw to the paddy soil to compensate the nutrient content, which is removed by the plant. As shown in Table 9, restoration of small amount of rice straw to the soil can provide the high amount of organic matter in soil compared to that of compost application.

Table 9. Amount of organic matter loss by annual rice cultivation.

Unit: (kg $10a^{-1}$)

Cropping system	Amount of OM Loss	Needed amount of OM to compensate the reduced OM	
		Application of rice straw	Application of compost
Single cropping (Rice)	75	375	750
Double cropping (Rice + barley)	113	565	1130

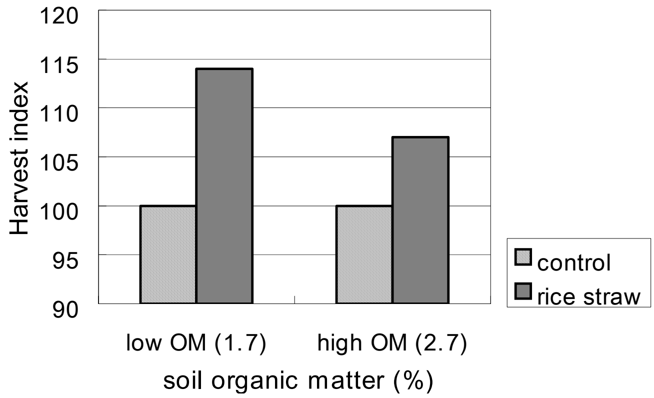

Fig. 1. Effect of the application of rice straw on harvest index in relation to soil organic matter content

3) Silicate fertilizer
Silicate is one of the crucial nutrients in rice cultivation to make a stable yield through strong plant production, good grain filling, improved resistance against pathogen, etc. Diseases such as brown spot and rice blast were reduced by application of silicate. Especially the effect of silicate on disease control was very high in brown spot (Fig. 2).

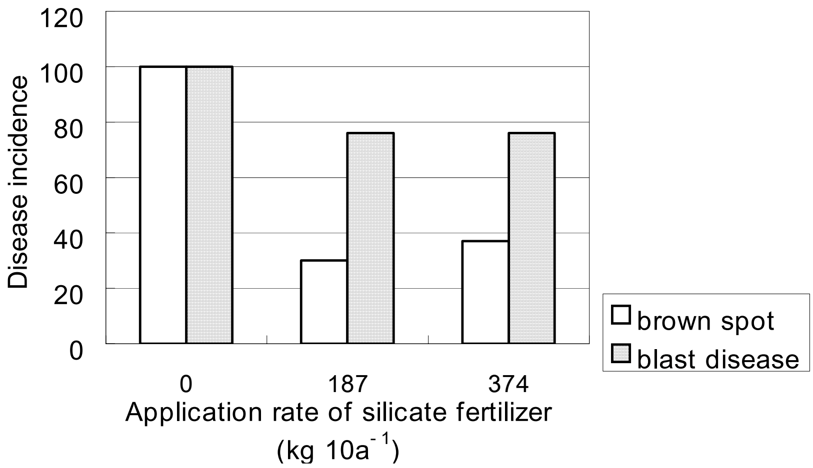

Fig. 2. Effect of silicate fertilizer application on the disease control in rice

4) Tillage method
Tillage is an environment-friendly, labor-saving method for energy reduction and soil protection. Soil chemical properties varied with tillage method (Table 10). Soil pH, available P, organic matter content, and cation exchange capacity were decreased in following order: no tillage> partial tillage> minimal tillage> conventional practice.

Table 10. Change in soil chemical properties depending on tillage method.

Tillage method	pH	Av. P_2O_5 (mg kg^{-1})	OM (g kg^{-1})	Cations ($cmol^+$ kg^{-1})				CEC
				Mg	K	Na	Ca	
No-tillage	5.4	144.7	32	0.82	0.71	0.28	2.55	7.8
Partial tillage	5.5	106.6	28	0.78	0.31	0.23	2.55	6.9
Minimal tillage	5.2	79.1	24	0.89	0.55	0.36	2.09	6.7
Control	5.0	82.7	23	0.81	0.53	0.37	1.85	5.8

5) Cropping system

Cropping system in paddy soil has been generally rotated with crops such as barley and wheat, field vegetables (i.e. garlic and onion), and house vegetables (i.e. watermelon, melon, and strawberry). Since short season cultivars have been strongly recommended in rice cultivation recently, six short season cultivars such as Keumo, ShinKeumo, Keumo 1, Keumo 2, Geuru and Manan have been bred and propagated in farmhouse since 1988.

Cropping system with forage crops is suggested to reduce the demand for imported cereal for livestock feed. The typical cropping system with forage crops in rice cultivation is alternate cropping of rice with barley and wheat or Italian ryegrass (Table 11).

Table 11. Typical cropping system with forage crops in rice cultivation.

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Double-cropping	Barley and wheat or Italian ryegrass							Rice				

Paddy-upland rotation system is generally practiced in suburban areas with higher utilization of upland than paddy field. This system is mostly applied in crops with poor soil, for example, watermelon, tomato, and flax. The appropriate transition period for the upland and lowland cultivation was 2-3 years, respectively (Table 12).

Table 12. Yield and income index by paddy-upland rotation in cropping system.

Cropping system	Harvest index			Income index
	Rice	Bean	Naked barley	
Rice (Bean+ naked barley) Alternate cropping	100	100	100	100
Rice (Bean+ naked barley) Continuous cropping for 2 years	109	83	118	108
Rice (Bean+ naked barley) Continuous cropping for 3 years	108	72	110	104

Pest control

1) Plant disease

Rice seed have to be collected in disease-free field for control of seed-borne disease, and it has to be selected by disease-free seeds by salt dipping method. For control of disease during seed germination and early stage of growth, the seedling boxes have to be sterilized after transplanting and stored in an appropriate manner for next year's use. It is important to use sterilized soil and avoid disease-prone place to plant

(1) Blast disease

Blast is generally considered as the principal disease of rice because of its wide distribution and its destructiveness under unfavorable conditions. Heavy infestation on the plant leaf and panicles are detrimental to rice yield. It is recommended to use resistant variety for the prevention of blast disease. Anda and Taebaek were found to be highly resistant to leaf and panicle blast(Table 1). Besides the use of resistant varieties, cultural methods such as time of transplanting, irrigation, and transplanting density are available.

(2) Sheath Blight

The disease causes spots on the leaf sheath. The spots are usually observed near the waterline. When the conditions are favorable to the pathogen, they are later formed also on the upper leaf sheaths and on the leaf blades. It occurs heavily under the condition of early transplanting, dense planting, and excessive fertilizer use. To prevent it, the primary source of infestation has to be removed and non-pathogenic microorganisms as a biological control method have to be implemented. Cultural methods such as heavy transplanting density are avoidable.

(3) Bacterial Leaf Blight

The disease usually becomes noticeable in the field at the heading stage. The resistant variety is available for the control of the disease(Table 1). The avoidance of flooding or deep water in the nursery and removal of primary sources of inoculum are recommended. The host plants such as 겨풀 and 나도겨풀 around water reservoir and irrigation canal have to be removed.

(4) Rice Black Streaked Dwarf Virus

Diseased plants showed pronounced stunting and also darkening of the foliage. The resistant variety is available for the control of the disease(Table 1). It is desirable to remove the overwintering site of vector, *Laodelphax striatellus* fallen and to eradicate infested plants as soon as possible.

2) Insect Pest

(1) Resistant variety

Anda, Milyang 30, and Samgang were developed as resistant varieties to brown planthoppers that is one of the most serious insect pests in Korea(Table 1). Among them, Anda was widely cultivated. However, these resistant variety can cause the development of a new biotype pest damaging the resistant varieties and low palatability rice products.

(2) Natural enemy

Seven parasitoids, 89 predator (including 85 spider species), 3 fungal parasites, and 1 nematode species are reported as the natural enemies of plant hoppers(Table 13). Parasitoid wasps and predatory hemipterans and spiders are known as major natural enemies among them. It is important to maintain spider population before the migration of the brown planthopper and whitebacked planthopper(Table 14). It was found that an individual of *P. subpiraticus* can eat 4.9 - 9.2 individuals of planthopper for one day(Table 15).

Table 13. Natural enemy of plant hoppers and leaf hoppers

Category	Species	Target stage
Parasitoid	*Gonatocerus spp.*	Egg
	Anagrus flaveolus	Egg
	Mymar laprofanicum	Egg
	Paracentrobia andoi	Egg
	Chaetosticha sp.	Egg
	Oligosita sp.	
	Tomosvaryella oryzaetora	Nymph
Predatory	*Echthrodelphax bicolor*	Nymph
	Haplogonatopus atratus	Nymph
	Qrius santeri	Egg, Nymph
	Cyrtorrhinus lividipennis	Egg, Nymph
Fungal parasite	*Boveria hassiana*	Nymph, Adult
	Metarhizium anisopliae	Nymph, Adult
	Entomophthora sp.	Nymph, Adult
Nematode	*Agamermis sp.*	Nymph, Adult
Spider	*Pirata subpiraticus*	Nymph, Adult
	Gnathonarium dentatum	Nymph, Adult
	Pachygnatha clercki	Nymph, Adult
	Clubiana haponicola	Nymph, Adult
	Ummeliata insecticeps	Nymph, Adult

Table 14. Seasonal presence of dominant species of spider and plant hoppers in rice paddy field.

Date		No. of individual / 0.25 m^2												
		May	June			July			August			September		
		L	E	M	L	E	M	L	E	M	L	E	M	L
Spider	*P. subpiraticus*	0	0	1	2	15	30	48	18	14	6	10	10	31
	P. clercki	0	0	0	1	0	0	2	0	2	1	3	2	53
	Clubiana sp.	0	0	0	0	0	0	0	0	0	0	0	0	1
Plant Hopper	BPH	0	0	0	0	0	0	2	15	28	45	100	191	102
	WBPH	0	0	0	0	7	13	32	36	52	50	33	19	16
	SPH	0	0	0	2	1	42	31	41	40	73	25	11	9

BPH(brown planthopper), WBPH(whitebacked planthopper), SBPH(smaller brown planthopper), E(Early), M(Middle), L(Late)

Table 15. The predation of dominant spider species in rice paddy field.

Spider / Plant hopper	Insect eaten (no. /day)		
	P. subpiraticus	*P. clercki*	*G. dentatum*
BPH	5.3	2.0	0.6
WBPH	4.9	2.4	0.6
SBPH	9.2	2.0	1.1

(3) Transplanting
The rice transplanting can cause the migration of insect pest into the rice field from overwintering site. Rice water weevil became one of the serious insect pests and overwintered on the bush of the mountainous area near the rice field. The number of weevil decreased as transplanting time was delayed. The weevil can be effectively managed by late transplanting of rice(Table 16).

Table 16. Damage of rice plant by rice water weevil at a different transplanting time.

Transplanting time	No. of larva/root	No. of pupa/root	Total
May 15	13.9	8.0	21.9
May 25	10.8	5.1	15.9
June 5	1.4	0.3	1.7

3) Weed Control

(1) Ecological weed control

- Tillage
It reduces the weed population by burying weed seeds, seedlings, and vegetative propagules deeply compared to non-tilled rice paddy. Suppress rate of weed in tillage of soil was higher than that in nontillage, and 42.4- 55.6% of weeds was decreased in tilled dry seeding paddy field. Besides, it exposed the weed tuber and vegetative propagules of perennial weeds on the surface of rice paddy resulting to reduced population of perennial weeds(Table 17).

Table 17. Suppress rate (%) of weed by tillage of soil.

Weed species	Tillage		Nontillage	
	Water seeding	Dry seeding	Water seeding	Dry seeding
Arrowhead	2.7	42.4	3.9	1.9
Flatsedge	0	49.5	0	0
Water chestnut	4.2	55.6	0	13.3

- Water management
Most of weeds in rice paddy are inhibited to germinate under a continuous flooded condition.

- Transplanting and Cultivation management
Transplanting timing is one factor to control weed population, and it helps that rice seedling have capability to compete with the weed population or even avoid the competitions. The number of

weeds decreased as transplanting time was delayed(Table 18). It was also reported to have lower weed population in transplanting rice paddy than in direct seeding rice paddy. The number of weed and weed species was lowest in hand transplanting of rice seedling and highest in the dry direct seeding(Table 19).

Table 18. The control effect of transplanting time on the occurrence of weeds.

Transplanting time	Weed occurred (no./㎡)	dry weight (g/㎡)
May 26	257	97.2
June 10	296	89.1
June 25	222	71.9
July 10	174	43.7

Table 19. The control effect of cultivation method on the number of weed and weed species.

Cultivation method	Weeds (No./㎡)	dry weight (g/㎡)	No. weed species	Yield (%) Decreased
Hand transplanting of 45 day old seedling	269	15.7	7	15
Machine transplanting of 30 days old seedling	295	58.8	10	27
Water direct seeding	840	751.6	15	50
Dry direct seeding	1,090	776.1	20	85

- Seeding rate and spacing

Seeding rate strongly affects the weed population. For instance, the occurrence rate of weeds decreased in 6kg/10a seeding rate than in 3kg/10a. Spacing also affects the competing capability of rice against weeds. There was a decrease in the population of weeds in 10x10cm spacing plot than in 30x15cm spacing plot.

- Variety

It is important to note that a variety adapted to the condition of soil, water, and local climate is another factor for better weed control. It is generally known that the rice variety having characteristics of tall, drooping, and rapid growth competes well against weeds. Early maturing variety is regarded to be less affected by weed population due to the shorter growing period than late maturing variety.

- Cropping system and Crop rotation

Continuous cropping using the same herbicide can cause a decrease in yield, an increase in the possibility of herbicide resistance, and the dominance of specific weed species. Cropping system of rice with barley, rye, and Italian ryegrass suppressed the weed population by 27-72%(Table 20), and crop rotation between rice paddy and upland cropping could also suppress it by 30-53%(Table 21).

Table 20. The occurrence of weed at various rotation of crop in paddy field.

Cropping system	Relative occurrence of weed(index)		
	Weed rice	Barnyard grass	Chinese sprangletop
Rice only	100	100	100
Barley and rice	44	65	43
Rye and rice	67	73	53
Italian rye grass and Rice	34	68	28

Table 21. The occurrence of weed at various years of crop rotation.

Rotated year	Annual weed (g/m^2)	Perennial weed (g/m^2)	Total (g/m^2)
Continuous rice	160.4	102.1	262.5
Every other year	92.7	93.1	185.8
Every 2 years	70.4	85.7	156.1
Every 3 years	43.7	79.2	122.9

-Mulching with barley straw or paper

Mulching can decrease the occurrence of weeds through blocking light and release of allelopathic substance. When the paddy field is covered with 200-300 kg of harvested barley straw per 10a, the occurrence of weed decreased by 70-94% compared with the uncovered paddy field(Table 22). Paper mulching was investigated to suppress the occurrence of weed for two months. Number of weed plant and weed weight was significantly reduced compared with that of control paddy field(Table 23).

Table 22. The control effect of harvested barley mulching on the occurrence of weed in paddy field.

Amount of barley (kg/10a)	Graminaceae weed (g/m^2)	Wide leaf weed (g/m^2)	Cyperaceae weed (g/m^2)	Total (g/m^2)
0	26.3	0.71	12.8	39.81
200	6.2	0.67	4.88	11.75
300	0.8	0.27	1.40	2.47
400	0.9	0.06	0.01	0.97
500	0.1	0.04	0.04	0.18

Table 23. The control effect of paper mulching on the occurrence of weed in the paddy field.

Treatment	Weed occurrence ($no./m^2$)	Dry weight (g/m^2)
Paper mulching	3.3	3.2
Control	146.0	94.4

(2) Biological control of weed

- Allelopathy variety
Allelopathy variety decrease the germination and growth of weed. The growth of root in barnyard grass was highly suppressed by the allelopathic rice varieties Chungmyung and AUS196. However, there was slight suppression in the emergence rate of barnyard grass seed and its plant height with these rice varieties.

- The use of pathogen
The control of weed by using pathogen was studied. *Epicoccosorus nematosporus* extracted from water chestnut was found to be effective in suppressing the number and weight of tuber in water chestnut(Table 24).

Table 24. The control effect of pathogen on the formation of tuber in water chestnut.

Treatment	Tuber (no./㎡)	Control effect (%)	Weight of tuber (g/㎡)	Control effect (%)
Epicoccosorus nematosporus (7.6 x 10^5 conidia/㎖)	80	83	37	84
Bentazon(0.2g ai/㎡)	16	97	14	94
Control	458	0	226	0

- Release of Duck
The release of duck has been used by farmers to control weed in the rice field. When 30 ducklings were released in 10 a rice field without any chemical fertilizer, the occurrence of weeds decrease by 96-98%, and the yield of rice increased by 8% compared with control field.

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Production of Organic Seed of Groundnut: Strategies and Practices

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ABSTRACT : Groundnut is the major oilseed crop of South Saurashtra region of Gujarat state of India. It contributes a greater share in national economy due to its high export value and diversified uses. During the production of groundnut many chemicals like Thiram and Captan for seed treatment; Urea, DAP and Single Super Phosphate as chemical fertilizers; Monocrotophos, Dimethoate and Endosulfan etc. for pest control; growth regulators and many chemicals for storage of groundnut are widely used. Need for more groundnut production from limited geographical area leads to indiscriminate use of these chemicals. These chemicals are having their harmful and residual effects on soil, plants, animals and human being and they are hazardous to nature.

But now people are awaked to reduce these hazards. They have started to adopt an alternative to chemical farming i.e. organic farming. Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives. Adoption of organic farming system focus attention on availability of seed material, which is organically produced. For the production of such kind of seed there should be minimum use of chemicals and mainly organic and traditionally prepared materials should be used in different phases of seed production and storage.

To apply major and trace element to groundnut crop organic manures like, farmyard manure, compost, sewage and sludge, night soil, oil cakes, meat meal, blood meal, fish meal, bio-fertilizers and vermi-composting can be adopted. Crop rotation, mechanical methods and use of bio-control agents for reducing pest, diseases and weeds should be encouraged. Use of neem leaves, other plant parts and other indigenously prepared material for storage groundnut seed is very essential. This paper covers many of the practices and strategies for organic seed production right from the seed treatment upto the storage of groundnut seeds are discussed.

All above practices and strategies are required for the organic seed production of groundnut. This may lead to increase in quality of produce, reduction of environmental hazards and pollution. The main benefit of organic groundnut seed production is that the residues of chemicals, which have long and harmful effects on health of consumers, can be reduced.

SEED KEEPERS : ORGANIC FARMING AND INDIGENOUS SEED CONSERVATION EXPERIENCES from TAMIL NADU, India

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Introduction

India is the home of one of the greatest diversity of both wild and cultivated crops. However in recent years, there has been a marked decline in the variety and diversity of cultivated crops such as rice and cereals. With the advent of the Green revolution, the emphasis has been to a large extent on the increase of yield; consequently a small number of paddy varieties selected for their capacity to give high yields in response to the application of high doses of fertilizer are being promoted. As a result, today the genetic base has narrowed down considerably.

Industrialized agriculture favours genetic uniformity. Typically, vast areas are planted with a single, high yielding variety - a practice known as monoculture - using expensive inputs such as irrigation, fertilizer and pesticides to maximize production. In the process, not only traditional crop varieties, but long - established farming ecosystems are obliterated. Genetic uniformity invites disaster because it makes a crop vulnerable to attack - a pest or disease that one plant quickly spreads throughout the crop. The Irish Potato Famine of the 1840s is a dramatic example of the dangers of genetic uniformity. None of the few varieties of the New World Potato introduced into Europe in 1500s was resistant to a potato blight that struck Ireland in the 1840s. The Potato crop was wiped out. Over a million people died in the famine and one million more emigrated to the New World.

More recently, in 1970, genetic uniformity left the United States maize crop vulnerable to a blight that destroyed almost $1000 million worth of crop and reduced yields by as much as 50 percent. Over 80 percent of the commercial maize varieties grown in the United States at that time were susceptible to the virulent disease - "Southern Leaf Blight". Resistance to the blight was eventually found in an African maize variety called Mayorbella. A major catastrophe was averted by the incorporation of this resistance into commercial varieties.

Stunted Rice : A `Wild' plant to the Rescue

During the 1970s, the "Grassy-Stunt Virus" devastated rice fields from India to Indonesia, endangering the World's single most important food crop. After a four-year search which screened over 17000 cultivated and wild rice samples of rice, only one population of the species Oryza nivara, growing wild near Gonda in Uttar Pradesh, was found to have a single gene for resisting "Grassy-Stunt Virus Strain 1". Today, resistant rice hybrids containing the wild Indian gene are grown across 110000 sq. km. of Asian rice fields.

Diversity of Rice Crop

According to Dr. Richaria, the well known rice scientist 4,00,000 varieties of rice existed in India during the vedic period. He estimates that, even today 2,00,000 varieties of rice exist in India - a truly phenomenal number. This means that even if a person were to eat a new rice variety every day of the year he would live for over five hundred years without reusing a variety. Every variety has a specific purpose and utility. Dr. Richaria has collected and identified 20,000 types of rice in the Chattisgarh area of Madhya Pradesh alone.

Farmers in every part of country have deep knowledge of their own rice varieties, of their environmental and nutritional requirements and their properties and peculiarities. This has enabled them to harvest a crop even under the most severe stress situations. Farmers also possess high yielding varieties of their own which are not recognised in agricultural extension programmes.

The alarming rate of ecological and biodiversity destruction has now been recognised and the need for conservation is acknowledged at the level of farmers and the state. There are a number of reasons for enlarging the diversity of cultivated crops such as rice and in this effort various indigenous varieties used by farmers have a key role to play.

Characteristics of Indigenous Rice Varieties

There are many reasons as to why indigenous varieties are still conserved inspite of all odds. High yielding varieties are not suited to all farming conditions and there are situations where indigenous varieties are better suited. For example, in the alkaline soils of Tamil Nadu an indigenous variety of paddy called - "Kalarpalai" alone can be cultivated. Varieties like Vadan samba are highly drought resistant. Most indigenous varieties are resistant to pests and they are less vulnerable and more hardy. Indigenous varieties require less farm inputs (such as chemical fertilisers and pesticides) and they yield straw which is valuable to farmers as cattle feed as well as roofing material. Many varieties fulfill specific nutritional and other dietary needs. Besides this, indigenous varieties provide the basic genetic material for developing any other variety in future.

Farmers seed banks for indigenous rice conservation

Though indigenous rice varieties are still preserved by a few farmers they are getting depleted at an alarming rate. It is becoming increasingly clear that to maintain biodiversity in farmers' fields an alternative system of seed supply has to be created. Although farmers greatly feel the need to regrow some of the traditional varieties they have lost, one has to be able to provide them with sufficient quantities of local seed varieties in order to fulfill this need. The community has to be convinced or has to feel the need to bring back lost biodiversity and any effort should be aimed at the community level. Several groups across the country are trying to preserve these varieties through on farm conservation. Our centre has been involved in setting up farmer's seed banks in villages in different parts of Tamilnadu. We would like to present our experiences in this paper. The setting up of a seed bank in the Valayampattu village, Chengam taluk, Tiruvannamalai dist. In the year 1993 – 94, our centre was working with farmers in the valayampattu village on the use of plant products for pest control. We were involved in participatory experimentation on farmers' fields. The programme was quite successful and farmers realised the benefits of using plant products as alternatives to pesticides. During the farmers meetings, several farmers felt that it would be beneficial for them if they had access to some of the indigenous varieties which they had been cultivating before the green revolution era. It was around the year 1995 that we came in contact with NAVDANYA. NAVDANYA is an All India effort by several voluntary organisations across the country to conserve indigenous varieties on farm. This movement is spear headed by the well-known environmentalist Dr. Vandana Shiva. With the help and support of Navdanya, CIKS launched its on farm conservation activity in the year 1995 in Valayampattu.

On farm Conservation Activity Expands

Our initial efforts in on farm conservation was in collaboration with NGOs in different parts of Tamilnadu. In Valayamapattu village we actively collaborated with 'Save the Eastern Ghats Movement' for setting up the community seed bank. After a year we expanded this programme to Tiruporur in Kanchipuram district with the help of Grammiya Munnetra Sangam (GMS), in the Nedumbaram village at Tiruttani with the assistance of Centre for Development of Disadvantaged Peoples (CDDP), at the Mosavadi village, Vandavasi with the help of VISA Peace centre and at the Manampathy village, Uthiramerur with the help of Women's Welfare Development Association (WWDA). In the year 1998 we started our work in the Kattankalathur block of the Kanchipuram district (the then Chengalpattu district) in a major way with the support of Council for Advancement of People's Action and Rural Technology (CAPART).

Survey and Collection of Indigenous Varieties

Our initial effort was to get access to the indigenous varieties. In every area of our work detailed survey was taken up by our field workers to find out the indigenous varieties of paddy already available in that area. We found that at least in some villages some farmers had the tradition of conserving these varieties for self consumption. We collected / purchased the seeds from these seed savers. Besides this gazetteers, district reports, travellers accounts, gave us information as to what are the traditional varieties that were grown in these areas before the hybrids came into picture. We made an attempt to get these varieties back to the farmers from other parts of the taluk / district or other parts of Tamilnadu if these varieties where still available.

Seed Collection through Biodiversity Contests, Bija Yatra and Participation in Fairs and Festivals

Efforts were also made to collect indigenous seeds by involving youth particularly the students by announcing contests (Essay & Oratorical Competitions) in this subject. By means of this, we were able to not only collect information about the varieties but we also were able to create awareness about the importance of conserving these varieties in farmer's fields amongst village students who are the future farmers of our country. A Bija Yatra was undertaken by several voluntary organisations to document information regarding the indigenous varieties available with the farmers and also information on indigenous varieties. CIKS was also part of this bija yatra and we collected information and seeds during this yatra.
We also participated regularly in agriculture fairs and festivals. In these fairs and festivals we had a display of our varieties and also exchanged varieties with farmers. Information regarding our efforts was distributed in the form of pamphlets which brought us in touch with more farmers who were interested in conserving these varieties and also with farmers who were conserving these varieties.

Collection of seeds from rice research stations

We have also made some attempts to get access to some indigenous varieties from the rice research stations of Tamilnadu such as Tirurkuppam, Ambasamudram and Aaduthurai.

Inventory of Conservators of Indigenous varieties
In every area of our work detailed surveys were made and an inventory of farmers in different villages who cultivate these varieties were made. This inventory contains information like the reasons for preservation of these varieties, special characteristics of these varieties, mode of cultivation etc.

Farmers seed banks for seed exchange distribution and utilisation

In every area of our work, a network of farmers has been organised for exchange of seeds and information. Several meetings were held in different villages with the farmers regarding the importance of the indigenous varieties. Farmers put aside part of their land towards conservation of indigenous grain varieties. They are provided with the initial supply of seeds which has been procured by us from that area and surrounding areas from farmers who already grow it. These farmers who are part of the programme are given the technical know how of manuring their field organically, treating the pests by natural control methods, use of vermicompost etc. The farmers are provided seeds with the understanding that at the end of the season he returns twice the quantities of seeds that has been taken from the seed bank. Farmers are also provided with bioinputs like biofertilisers (azospirillum, acetobactor etc) and neem seed cake.
Detailed documentation of every farmer is being maintained by us. We have detailed information about the crop at every stage, the type and quantity of inputs used, pest control techniques used, characteristics of crop, yield obtained and other details.

Arogyam - A Marketing Support Programme for Conservation of Indigenous Varieties

During the Course of our work on Conservation of Indigenous Varieties one of the important constraints that the farmers met with was that of finding a market for their varieties. It was very depressing to note that they do not get a reasonable return in the regular market. To overcome this, CIKS had evolved a programme of linking up the consumers with the farmers. Arogyam is a programme wherein we have registered members. These members ensure the purchase of organically grown indigenous varieties. This programme is done on the initiative of the centre and it provides a good market for the farmers cultivating indigenous varieties organically.

IN SITU CONSERVATION CENTRES

During the course of our work for the last 10 years on indigenous seed conservation we have made a collection of more than 130 varieties of paddy suitable for cultivation in Tamil Nadu. There are a network of farmers who cultivate this and conserve this year after year. The farmers choose to cultivate one or two varieties depending on his soil type, irrigation facility and agroclimatic region to which he belongs. However, all these varieties have to be conserved year after year. We also need to conserve them in more than one region so that it is not destroyed due to the vagaries of climate. Besides this, we need to experiment with any new variety that we get and cultivate it at least for a few seasons before passing it on to the farmers. Some times we also get access to rare varieties and the amount we get may be a handful (say a few grains). These have to be cultivated with great care and propagated. In addition to all these we need places where these varieties are cultivated year after year and farmers can come and take a look at the standing crop and decide for themselves what they would cultivate. For all these purposes in situ conservation centres have been set up in the experimental farm of CIKS and selected farmers fields. In these in situ conservation centres more than 50 varieties are grown at a time.

Integrated Home Gardens

During our work with indigenous paddy cultivation we realised that the very concept of home gardens were fast vanishing. When we did a survey to find out the reasons we realised that the introduction of high yielding varieties and subsequent loss of local varieties was one of the main reasons for the disappearing home gardens. Women farmers could not afford the high price of hybrid seeds for home gardens and even if they buy it paying a high cost, the germination capacity of it was very low. They could not use it for the next season. CIKS made an intervention in this area also and we have succeeded to bring back at least 50 indigenous vegetable varieties which are cultivated in the home gardens of these women. These women cultivate the vegetables organically and our centre provides training for the same. We have also trained women to produce good quality seeds. Every family involved this programme produces at least Rs. 300/- worth vegetables. This adds to the nutritional security of the family. In addition to cultivating vegetables in these gardens women are also encouraged to cultivate herbs which can be used in curing common ailments. They are provided training on organic cultivation of herbs and also the know how of preparing some of the medicines for self help. This is a 100% women based programme.

Trainings, Outreach Programmes and Production of Educational Material

Our centre provides constant training to the network of farmers on organic cultivation of indigenous varieties. They are also trained to prepare plant based biopesticides on their own. Farmers are also trained in various composting techniques. This helps them to become self sufficient as far as farm inputs are concerned and also saves them a lot of money. Out reach programmes are also conducted regularly to increase awareness in other sections of the village community. Essays and oratorical competitions are held in schools. Our centre also has produced a number of publications in the form of books, posters and films on organic agriculture and biodiversity conservation.

Organic farmers sangams

After nearly 10 years into this programme we have come up with certain models for the maintenance and sustainability of the effort. Currently, we have nearly 2000 farmers spread in nearly 108 villages who conserve these varieties organically. There are more than 800 households which maintain integrated organic home gardens. In every village we are in the process of forming organic farmers sangams. So far we have established 13 organic farmers sangams. These sangams have members who come together for a common cause of organic farming and indigenous seed conservation. The sangam members pay a monthly subscription which is maintained in a bank account. They have elected office bearers to take care of and give directions to working of the sangams. The sangams maintain the village community seed bank. Storage structures for these are initially provided through the programmes with a beneficiary contribution and later it is maintained by the sangam. The borrowing and returning is controlled by the sangam. Samgams may also be provided with certain agricultural implements like sprayers, tarpaulin sheets for drying grains and so on which is hired out for a nominal rate. Some sangams also run biopesticide units as an income generating activity. The basic know how and the structure is provided by our centre.

Conclusion

Starting from a handful of five indigenous rice varieties our biodiverse organic farming programme has enlarged to a major effort. Currently, we have more than 130 rice varieties being conserved organically and more than 50 varieties of vegetables providing nutritional security to households. We hope to expand this effort to the entire state and probably to the entire country.

APPENDIX – 1

CHARACTERISTICS OF INDIGENOUS VARIETIES

Thanga samba
The earhead of this variety is very long. Since this variety of rice is extremely fine and long it is used for the preparation of special dishes like pulav. It is suitable for the South Indian meal.

Neelan samba
A highly suitable variety for areas which are prone to water logging. It is best suited for cultivation in the vicinity of lakes. Resistant to brown plant hopper and earhead bug. It increases the milk yield in lactating mothers and hence suitable for them. Since the straw is very long it is used as a roofing material.

kurangu samba
The earheads are very long. There are upto 267 grains in one earhead. It grows in areas prone to water logging as well as dry areas. Highly resistant to pest and disease.

seeraga samba
Since the rice of this variety resembles the shape of a spice "Seeragam", it has got the name "Seeraga Samba". The rice is extremely fine and aromatic, hence it is used for making 'Biriyani'. Though the yield is very low, since it is aromatic, it fetches the highest price amongst all indigenous paddy varieties of Tamil Nadu.

samba mosanam
This variety is also called Puzudikal, Eri nel and Maduvu muzangi. It is suitable for growing in the vicinity of lakes. It is said that people travelled by boats and harvested the 'Samba mosanam' in the lakes. The variety is good for preparing aval (flattened rice), idly and dosa.

KULLAKAR
This variety is highly suitable for preparing the idly and dosa. It is also used in the preparation of porridge. Since it is a short duration variety it can be grown in all the three seasons. Highly resistant to pest and disease. The straw is preferred as a roofing material.

thooyamallee
The rice of this variety is highly suitable for the South Indian meal. It is also used for making special dishes like 'Biriyani'. During the flowering stage, the earheads look like flowers. In Tamil 'Thooyamallee" literally means pure jasmine. Since the rice of this variety is white in colour like that of jasmine it is known by this name. Highly resistant to pest and disease. Since this is a fine variety it fetches a good price.

kuzhiyadichan
Kuzhiyadichan is highly suitable for making dishes such as idly and dosa. Suitable for saline soil and land which has good drainage facility. Highly drought resistant. Highly resistant to pest and disease. It is also called 'Kulikulichan'. It is ideal for lactating mothers, since it increases the milk flow.

kallimadaiyan

The rice of this variety is highly suitable for making a South Indian snack called 'Murukku'. The Manapparai murukku became very popular since it was prepared by using this variety of rice. It is also suitable for the South Indian meal. Highly resistant to pest and disease.

pitchavari

The rice of this variety is highly suitable for making a special dish called 'Pittu'. It is used for treatment of diarrhoea in cattle. It also increases appetite in cattle. Highly resistant to pest and disease. It is suitable for cultivation in areas prone to water logging as well as drought prone areas.

APPENDIX II

EXPERIENCES OF FARMERS CULTIVATING INDIGENOUS RICE VARIETIES

1. Experiences with Samba Mosanam variety

Samba Mosanam is also called as Eri Nel (meaning paddy variety cultivated in lakes; Eri in Tamil means lakes), Puzhuthikkal Nel, Maduvumuzhungi, Poovan Samba. The duration of this crop is from 160 – 165 days. It can withstand drought and water logging conditions. The experiences of farmers who cultivate this variety are listed below :

EXPERIENCES OF FARMERS :

(1) Mr. Gajendran,
S/o. Mr. Govindasamy,
Kinathu Theru,
Umaiyalparancheri,
Serappanancheri (post),
Padappai Block.

Mr. Gajendran has been cultivating Samba Mosanam for the past 30 years. Since his field is adjoining a lake, he sows the crop before the onset of monsoon. By the time, the crop is ready for harvest, the lake would be full. During this period, all parts of the plant except the earhead would be completely submerged in water. When the earhead matures, the crop is harvested and tied in bundles. These bundles are then placed on a wire cot. Later, these are dragged from the lake to the main land. The bundles are then dried in shade and the grains are separated. This farmer gets a yield of 26 bags (26 x 80 kgs) per acre of land. The farmer also feels that it is impossible to cultivate any other variety in this type of land. He uses the hay from this paddy variety to make grain storage structures like Ambaram and also for roof – making.

(Method of constructing Ambaram – Refer Parampariya Velanmai Seithi Madal – Vol. 1. No.1,2,3)

(2) Mr. Manickam,
Sengai Amman Koil Street,
Kalivandhapattu village,
Kayirambedu Post,
Chengalpattu Taluk,
Kattankolathur block

This farmer has been cultivating Samba Mosanam for the past 10 years. He cultivates this paddy variety in his farm that adjoins a lake. He states that at the time of harvest, only the earheads can be seen above the water level. As the water level in the field increases, the length of the stalk also increases, he states that sometimes, this crop can grow even upto a height of 7 feet.

He recalls that several years back he had to use a catamaran for harvesting because of a high water level. 3 years back, the harvested bundles were placed on a wooden ladder and then dragged to the upland. He states that no other paddy variety can be cultivated under such environmental conditions.

The rice of this paddy variety is good for preparing idli, dosa. He does not sell the produce. This rice is cooked, left overnight and then consumed. Mr. Manickam claims that this rice variety gives him the strength to work actively. He gets an average yield of 64 bags (of 80 kgs each) from 2 acres.

2. Experiences with Pitchavari variety

The duration of this crop is about 110 – 115 days. Pitchavari is also called Manakkattai. In Kancheepuram district, this crop is generally cultivated either as wet sown or by transplantation during the Navarai season (December – January). The experience of a farmer who has been cultivating it for over 3 generations is given here :

Mr. P. Krishnan Pillai, Konganancheri, Kattankolathur Block

"We have been conserving this variety for the past 3 generations (We have not cultivated it for the past 4 years). It is ideal for cultivation in clayey and alkaline soil. It can tolerate drought to a certain extent. It can withstand water logging.

We have sold our land to a brick kiln unit. They have removed the soil to a depth of 3 feet. Even if there is little rainfall, water stagnates in the field. In this type of land, only Pitchavari can be cultivated during the Navarai season. Other varieties of paddy cannot be cultivated. We get a yield of about 18 bags / acre.

Since the rice of this variety is fine, it can be used for cooking and also for preparing idli, dosa. It is an ideal variety for preparing "Pittu". Hence the rice of this variety is also called "Pittu Arisi".

MEDICINAL PROPERTIES

When the cows are affected by Ambai disease, they refuse to eat the fodder. If the cows are fed with rice of Pitchavari variety, the cows get cured and start eating fodder. Similarly, if there is purging in cattle, Pitchavari rice is fed to them. This cures the disease.
Since the grains of this paddy variety is black in colour, people do not normally offer it to the Gods.

3. Experiences with Kullakar variety

The duration of the Kullakar crop is from 100 – 110 days. It is either wetsown or cultivated by transplantation during Navarai (Dec. – Jan.) or Sornavari (March - April) season.

A FARMER'S EXPERIENCE

Mr. K. Balaraman, S/o. Mr. Kannan Naidu, Ozhalur, Kattankalathur block, Chengalpattu Taluk, Kancheepuram District.

This farmer has been cultivating Kullakkar for the past 50 years. He claims that he cultivates this crop since its duration is less, incidence of pest attack is low and the cost of cultivation is meagre. Since the straw of this variety is long and strong, he uses it for roof-making. If straw of other paddy varieties are used, they are not so durable and have to be replaced after a year.

If the straw from Kullakar variety is used, it can be replaced after 2 – 3 years. After using it for roof-making for his house, he sells the rest of the straw to his neighbours who also used it for the same purpose. He claims that he mainly cultivates it for the straw used in roof-making.

This variety can yield upto 16 bags / acre. According to him, the rice of this variety is good for making idli. His family has been consuming rice of this variety for several years. They feel that the other varieties are tasteless compared to it.

This rice variety is specially used during "Seemantham". (a ceremony conducted when the woman is pregnant).

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*SEEDS FOR SURVIVAL
(A concept dedicated to conserve and promote indigenous seeds varieties in the interest of food security)

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ABSTRACT : While GMO became an increasing threat to the subsistent farmers around the globe, and although it has not made its way to Nepal so far, it is disappointing that the importation and use of hybrid varieties in Nepal have been a common trend in the recent days. These so-called modern high yielding varieties are gradually replacing indigenous varieties, which have been inherited and used by the Nepalese farmers since the time immemorial. These hybrid varieties although produce good yield in the beginning, they are not sustainable in the long run as they demand high external input and management which the poor farmers can not afford. Compared to the local varieties they are also more prone to pests and diseases posing a threat of food security to the subsistence farmers due to which the survival of the resource poor farmers is being questioned.
It has become essential to conserve and promote local indigenous varieties. These varieties are easy to manage because they are developed based on the local indigenous knowledge. They perform moderately even with the low external input and comply with nature friendly cultivation techniques. Ex-situ as well as in-situ conservation and development of these varieties at local level is imperative. To address this, a 5 year project "Seed For Survival (SFS) has therefore been launched in partnership with Nepal Permaculture Group and its 2 member organizations. This 1st phase project have been funded by Uniting Protestant Churches of the Netherlands, one of the member organizations of United mission to Nepal.

1. INTRODUCTION:

Seeds For Survival began in July 2002 as a 1st phase two-year pilot project of a full 5 year life in an effort to conserve, improve and promote local food crop varieties and to raise awareness among farmers of the need for sustainable approaches to food production in rural Nepal.

In partnership with United Mission to Nepal (UMN), the project is being implemented by the Nepal Permaculture Group (NPG), and two of its member organizations: Ecological Services Centre (Ecoscentre), Tanahun, and Team Organising Local Institutions (TOLI), Kaski.

2. Rationale for Seeds for Survival

2.1 Requested by farmers

During the joint implementation by NPG and the United Mission to Nepal (UMN) of a previous project, "Promoting Sustainable Agriculture in Nepal" (PSAN), which completed its funding period in July 2001, the problem of loss of local crop varieties and degradation of soil due to chemical use was identified by farmers. It was upon the instigation of the farmers themselves that Seeds For Survival was first proposed.

2.2 The alarming growth in the popularity of hybrid varieties

Imported food crop varieties are becoming increasingly popular among farmers in Nepal, with their higher yields and the lure of "scientific" methods. Their adoption has been encouraged by government extension workers, international non-government agencies and the agricultural establishment. They have been welcomed as the key to increasing food production and modernizing farming methods in Nepal. Their widespread adoption has come at a cost, however, as farmers have replaced their traditional landraces with these so-called hybrid varieties and the chemical package that accompanies them. While traditional varieties may be moderately-yielding, they are at least very well suited to their local environment with limited input, its climate, rainfall, soil conditions, and local tastes. They also have resistance to certain crop diseases that introduced varieties do not.

2.3 Hybrid varieties favor the rich, marginalize the poor and lead to soil degradation.

Local varieties perform well in soils rich in organic matter, managed by poorer farmers who cannot afford the expense of modern varieties and their inputs. They fall well within the management capabilities of women and poorer farmers. Women are also traditionally the managers of the exchange of local seed. In order to obtain optimum performance from modern hybrid varieties, however, certain prescribed quantities of imported chemical fertilizer must be used. Seed must also be bought. Wealthy farmers may be able to afford this investment, but poorer farmers have to seek credit (offered by money-lenders at usurious rates) in order to buy it. Women might be entirely excluded from the whole decision-making and purchasing process. Further, having applied the necessary fertilizer (usually in the form of urea and majority of farmers do not have idea as to how to apply the correct amount), farmers are unlikely to go to the added trouble of applying organic material in the form of manures and composts. This leads to the eventual acidification and degradation of the soil, a phenomenon now commonplace in Nepal.

By encouraging the conservation of local varieties and affirming their value to the local community, the project seeks to benefit poorer farmers and women, and to prevent further soil degradation in the project areas.

2.4 Agro-biodiversity a strategy crucial to the risk-averse farmers

Poorer farmers tend to avoid risk. By growing several varieties of the same crop, a farmer can minimize the spread of disease or the effects of adverse climatic or physical conditions. The introduction of modern varieties to rural areas of Nepal, and their enthusiastic up-take by farmers has meant that large areas of cropping land have been given over to the production of single varieties. This can lead to the quick spread of disease, and to losses and disaster that worst affect the poorest farmers. Local varieties, though their yields may be lower to moderate, tend to give more reliable yields, and are not dependent upon the bought inputs that imported varieties demand. Thus food security could therefore be ensured.

2.5. Loss of local varieties can lead to dependence upon imports

Once local varieties have fallen into disuse their seeds are no longer collected, and they are lost to the community. It may be that the variety survives in another area, and that a determined farmer could retrieve a sample and restore the variety to his or her locality, but so prevalent has been the spread of modern varieties throughout Nepal that many local varieties of food crops are known to have been lost forever. As farmers come to depend upon the new varieties they have adopted, they are finding themselves no longer able to choose which crops they grow. Their decisions are determined by the seed merchants and by the companies producing them. By losing its local varieties a community effectively hands over its decision-making sovereignty to outside agencies. While development efforts seek to empower communities by presenting choices to farmers, the widespread adoption of new seed varieties runs in an entirely opposite direction: towards community disempowerment.

3. VISION

The SFS programme shares the vision that:
Farmers in the rural Nepal will have the skills, capacity and organizations to conserve and utilize their local genetic resources (particularly local seed varieties) as required for the sustainable agriculture practices.
Marginalized farmers of the target area will improve and sustain their income level through sustainable agriculture production and other agro based income generating activities.

4. GOAL

Farmers of the project area will understand the need to conserve and be motivated to use local accepted seed species of the agricultural crops and adapt appropriate farming technologies for the promotion of food security and sustainable agriculture system.

5. MISSION

Over the SFS project life, the mission of the program will be to:

5.1 raise awareness of rural farmers on the importance of local plant varieties and it's present status.
5.2. carry out organizational assessment of the NGOs/CBOs for their capacity build up

5.3. enable NGO's/farmer's (group member's) skill and capacity development for
-
- The establishment and maintenance of seed bank and live gene bank of crop species like rice, millet and horsegram (The crop species are liable to change according to project areas and available agro biodiversity in the area)
- Indigenous crop improvement through participatory technology development adapting agroforestry based income generating activities as appropriate.
- Establishment of farmer's cooperatives through groups profile for registration

6. PROJECT PERIOD: 2 year of the total five years (2001 - 2006)

7. TARGET GROUP / PROJECT AREA

The target population of the SFS will be the subsistent farmers of ***2 districts***; namely Kaski and Tanahu. The focus area within the targeted districts (3 VDCs per district) will be identified in consultation with the related line agencies, farmer leaders, political leaders of the specific area and other stakeholders of the SFS. The basis for selecting the Communities could be based on:

- Degree of vulnerability of the places in terms of plant genetic ***diversity and associated*** indigenous knowledge.
- Marginal communities and the existence of like minded organizations who share the common values/goals and contribute their participation (eg share human resource, part of the cost.)
- ***Difference in socio-cultural setting***
- Willingness of the farmers to extend their cooperation towards achieving the SFS goal Accessibility (proximity) to the regional Lead NGO to coordinate SFS activities
- The prevalence of land resource and willingness of the local NGOs to SFS
- Feeling of ownership of the program in NGOs as well as in community.
- Site selection based on different climatic conditions.

8. OBJECTIVES, STRATEGIES AND EXPECTED OUTCOMES

Objective 1: For conservation and Utilization of agro biodiversity , collaborate with like minded organizations to establish and maintain live gene banks through identified lead NGOs at farm level in all resource centres located in different ecological zone. The crop species to be included will be all available local crop varieties of major self-pollinated crops particularly paddy, millets and horse gram [including their wild relatives]. The documentation of the indigenous knowledge, genetic resources and rescuing of the vulnerable crop species also will be emphasized.

Strategies
- Select lead partner NGOs in each ecological zone that possess at least 2500 square meter own land resources as required in maintaining live gene bank at farm level. Develop these NGOs as model resource center or a interaction point.

- Together with concerned farmers, determine crops of self pollinated and vulnerable types genetic base, collect samples of indigenous varieties and maintain seed bank including live gene bank.
- Ensure that the resource centre allocate required land to grow identified crops every year until the complete transformation of this technique (4 year later) through co-operatives, to the respective communities.
- Closely monitor and assess the performance of each and every crops as maintained in live condition, document them properly.
- In co-ordination with farmers and surrounding Government research centres, identify promising varieties out of the species maintained, for further development.
- Identify local landraces of the specific crops and carry out crop breeding activities in on farm level involving farmers in the process. Conduct farm level operations in order to aid value for further improving the good seeds at both farm and on-farm level.
- Provide interested farmers with appropriate seeds from the live gene bank in a minimally subsidized rate.
- Carry out extension activities in collaboration with the other research farms or government agencies.

Objective 2: In collaboration with Agriculture Forestry Consultancy Unit (AFCU) of UMN, NPG will mobilise lead member organisations to help establish seed banks of locally accepted crop varieties (e.g., rice, millet and horse gram) in each region with suitable distribution system developed in a participatory way, specific to each project areas. Promotion of such potential indigenous traditional seed varieties will be emphasized.

Strategies
- Design and prepare appropriate storage facilities (structure/rooms) for display and storing the collected seed samples.
- Determine/identify the types of crops for local seed sampling, design formats to this purpose and assign staff/farmers as required to perform this job.
- Document necessary information regarding the collected samples. Collaborate and send the collected samples to National gene bank
- Organize seed fair/Haat Bazaar to sensitize the SFS's purpose and encourage farmers to display types of seeds available locally.
- Conduct training separately for staff and farmers on seed storage/ handling technologies including post harvest technologies.
- Identify promising seed types of indigenous varieties accepted by the farmers in the targeted crops. Using local farmers, multiply such varieties to make it readily available.
- Establish a museum for **antiquities** specially traditional tools, utensils and storage structures as available in local areas, encourage farmers to use these low cost materials/or develop improvements.

Objective 3: UMN will collaborate NPG to conduct crop improvement programme (to add value) based on participatory technology development with farmers in the selected communities of the project area through lead NGOs. NPG staff member organisations and farmers within the five year period, will be able to handle these activities on their own in an sustainable manner.

Strategies

- In co-ordination with farmers and surrounding Government research centres, identify promising varieties out of the species maintained, for further development.
- Select farmers in each project area for the participatory crop improvement activities
- Together with farmers determine number of sites for participatory crop improvement activities
- Identify local landraces of the specific crops and carry out crop breeding activities in onfarm level involving farmers in the process
- Explore and document local crop diversities, their characterisation and indigenous knowledge system associated with them
- Develop framework for the implementation of the conservation and utilisation

Objective 4: In consultation with AFCU, NPG through its lead NGOs will mobilize or support local farmer groups (of both existing and new) of the project area to develop them into cooperatives. (Within 5 years Farmers' cooperatives will be able to realize about the importance of indigenous crop improvement, maintaining seed banks/ Live gene bank and replicate such activities by themselves. The income level of the farmers will have been improved gradually as a result of the above and agroforestry based income generating activities which has resulted in gradual improvement in their standard of living).

STRATEGIES

- Identify the focus communities and the leader farmers in the respective districts.
- Facilitate farmer's group formation and support such groups by introducing saving and credit programme for agroforestry based Income (IGA) Generating Activities.
- Provide training to the group members on seed banks, seed multiplication procurement and distribution, IGA, organic farming, crop breeding etc as required.
- Closely link members of the groups with the activities; participatory crop improvement program, seed bank and gene bank carried out by respective Lead NGOs involving CBOs.
- Conduct awareness raising activities (role play, street drama, slide, video show etc) in the communities to give message on the importance of indigenous seeds, distribution system, improvement and their management, bio-diversity and sustainable agriculture.
- Hold farmers day/seed fair day, environment day and world food day every year, encourage establishing this tradition so that the groups can continue after the project phases out.
- Organise farmer's field trips and expose them to relevant agriculture farms and centres and to the activities carried out by some model Cooperatives.
- Equip and prepare at least 22 farmer's co-operatives (30 % of the total groups 72) in the project areas to sustain SFS activities (particularly maintain seed banks including live gene banks).
- Promote saving and credit scheme, provide low interest matching funds as revolving funds in the form of soft loans to the targeted groups/co-operatives.
- Hold farmers workshop at local and regional level to share experience and knowledge once in two year.

Objective 5: The lead NGOs and Community Based Organisations (CBOs) working in different ecological regions will be strengthened in order to implement SFS to better serve Nepali farmers through seed bank, crop improvement and live gene banks programs. Members will have an increased capacity in delivering training, demonstrated documentation in doing on-farm research in seeds / bio-diversity and expand its networking and learning by sharing with other interested organizations.

Strategies:

- NPG will identify 2 lead NGOs and 4 CBOs in each district, report the progress regularly.
- NPG will in consultation with AFCU/UMN conduct organizational assessment of the needy member organisations for their capacity buildup.
- In order to make familiar, NPG will conduct orientation session to concerned staff of lead NGOs and respective CBOs about SFS.
- NPG will organize need based technical training on seed management, seed bank and live gene bank.
- NPG will widen its networking and communication system through proper documentation and publication.

Objective 6: The partners (AFCU/UMN, LI-BIRD and NPG) will disseminate and share the findings / outputs of the project among wider stakeholders (GOs, NGOs Donors, Policy makers apart from farmers)

Strategies:

- Hold national-level workshop (including NPG convergence) to share finding/results and experiences among farmers and extension staff and other stakeholders.
- Participate in national/international workshops and seminars, to share knowledge and results of on going activities of SFS.
- Actively network with other similar organizations in Nepal and South/East Asia, and pass on knowledge to other professional agriculturists/foresters in Nepal.
- Facilitate learning exchanges with farmers and other agriculturists.

9. MONITORING AND EVALUATION

Monitoring and evaluation will be carried out by NPG, UMN and Farmers on half yearly and yearly basis and effectiveness of the strategies, to leave positive impacts of the project, will be assessed. Necessary revision on strategies will be made based on the learning, if required. Mid term and final evaluation will be done by using outside agencies which will recommend either continuation (follow up programme) or phase out of the SFS project.

10. Update of the main achievements made so far:

- Workshops held at community level (4 nos) and district level (2 nos) in regards to the importance of conservation, improvement and promotion of indigenous varieties in view of the possible hazards posed by GMO.
- Held 4 coordination meeting with different agencies in the districts and centre.
- Identification and mobilization of community based organization and groups in both sites; - Tanahu and Kaski, their capacity building work is on going.

- Training conducted for staff and the leader farmers in each site specially in the technical field related to seed handling, management, organic agriculture etc.
- Farmers specially women farmers are taking lead in collecting traditional seeds which are promising, have been using them in their farms, are also involved in disseminating information regarding local landraces, bio-diversity etc through local fairs and other social gatherings. They also voluntarily go house to house for doing this types of work in their neighbours.
- Seed museums have been established and maintained in community, district and central level.
- Live gene bank have been initiated in the resource centre farms with local crops; millet, buck wheat, paddy.

Conclusion:

More recently an internal evaluation has been carried out to assess the progress of the SFS. The evaluation found that the activities are in line with its goal and objectives. The team have recommended continuing the project in the future.

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Assessment of Farm Animal Welfare using Organic Animal Husbandry Standards as Yardstick: A micro-level study in India*

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ABSTRACT : Animal welfare has attracted widespread attention worldwide in recent times including within the conventional systems of intensive production in industrialized countries. It can be assessed in a number of ways, also, the yardstick of welfare may differ from people to people and region to region since OIE is only now considering development of more science based internationally acceptable criteria for animal welfare . In this study, the organic livestock production standards, developed inter alia, the Government of India (GOI) under its National Programme for Organic Production (NPOP), were used to assess the practices being followed at farmers' level in India. Organic production standards are supposed to keep animal welfare as one of the top most requirements with no compromise on welfare issues. A micro-level study was conducted in Bankura district((22038'N - 23038'N and 86036'E - 87046'E) in India with 50 tribal and 50 non- tribal farmers practicing mixed crop-livestock farming. The farmers (Average landholding 1.02ha, Av. Herd size 4.02 cattle equivalent), were asked about several animal welfare criteria including those for draft animals. It was found that almost all the farmers, either, tribal or non-tribal provide shelter to animals against extreme weather conditions. 90 percent of the farmers provided immediate treatment to sick animals and none of the farmers used sick animals at work. However, 26.46 percent of non tribals beat their animals at work. 9.85 percent farmers confessed that they sometimes overlaod their animals. The average duration of work in summer, rainy season and winter was found 5.27 hrs, 7.09 hrs and 5 hrs, respectively. In the study, it was found that the welfare standards were well cared of though the farmers were not organic per se, nor they have had any specific training or programme on animal welfare measures. It is recommended that the organic animal standards may be used as yardstick to measure animal welfare even in conventional non-organic forms of livestock production systems as is demonstrated in the current study.

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INTRODUCTION

With rising awareness and consciousness on environmental, ethical and welfare issues, consumers now expect their food to be produced and processed with greater respect for the environmental safety and welfare of the animals, especially in developed countries such concerns are being pursued with increasing significance. In developing countries like India too, the consumers are increasingly looking for quality in food products, for example, milk (Chander, 2001). As such, food quality is determined not only by the nature of the end product but also by the welfare status of the animals with or through which the food was produced. Animals are fundamental to organic production since animals inter alia help produce organic manure on-farm which is very important for sustainable organic production. Whereas, in organic production systems, animal health, well-being and their welfare is of supreme importance. Animal welfare, though easy to talk but considerably difficult to define and measure objectively on-farm. In absence of valid, reliable, feasible and universally applicable tool for measuring animal welfare, it has remained a subjective parameter often leading to disagreements by different interest groups. Therefore, there is increasing demand for scientifically- based -on –farm welfare assessment systems.

The OIE (the world organization for animal health) has taken initiatives towards preparation of internationally applicable guiding principles and standards for animal welfare. The OIE is committed to ensure that its standards are science based. The taskforce recently set up by OIE is expected to develop the science based standards for animal welfare to be applicable for all kinds of animal production systems. Nevertheless, organic standards developed by various organizations viz. IFOAM, Soil Association (UK), EU, including by the developing countries like India have comprehensive set of animal welfare measures to be followed strictly in order to qualify products as organic. The organic production systems are expected to follow rigid regime of standards towards ensuring high quality of products. Animals are to be kept in natural environment as much as possible allowing them to express their innate behavior. Therefore, in this study, the organic livestock production standards, developed inter alia, the Government of India under its National Programme for Organic Production (NPOP, 2000), were used to assess the practices being followed at farmers' level in India with respect to among others, the draft animals.

Organic animal production standards are supposed to keep animal welfare as one of the major requirements with no compromise on welfare issues. Under organic production systems, not only the cruelty against animals is eliminated but also animals are allowed maximum freedom to express their natural behavior. The conventional production systems too are now emphasizing strict welfare measures to be taken. Keeping this in view, a study (Pathak, 2002) was undertaken basically to see how deviant are the farmers' livestock production practices vis a vis organic production standards witch included among others animal welfare measures, since most of the organic standards are directed towards attainment of highest standards of animal welfare.

Materials and Methods

A field survey of 100 randomly selected farmers (50 tribal and 50 non tribal farmers drawn from 4 villages) was carried out during 2001-2002 in Bankura district of West Bengal state in India (22038'N - 23038'N and 86036'E - 87046'E). The farmers were mostly small and marginal farmers (<2 ha of land) following crop livestock mixed farming systems. An interview schedule was developed in congruence with the organic animal husbandry standards developed by GOI which are more or less similar with IFOAM international organic production standards. The farmers were interviewed on their farms about the practices they follow. The researcher's observations with respect to organic production standards were also recorded. The aim was to find out the deviations in practices followed by the farmers with that of the prescribed standards. An arbitrary method of scaling was followed to quantify the deviations in production practices.

To quantify the organic animal husbandry practices followed by the respondents, the overall response regarding each practice was put on a 3 point continuum. Practices which closely follow organic standards (within 20% limit) graded with 2 points, practices which were opposite to the prescribed standards (within 20% limit) graded with 0 point, practices in between these two were graded with 1 point. As for example -

According to Indian organic standards, reproduction technique has to be natural service not A.I. (now AI is allowed after harmonization efforts at international level, since AI was permitted under EU regulations)

So, if 80-100 percent farmers follow natural service, grade point will be 2,
If, 21-79 percent farmers follow natural service grade point will be 1 and, if, 0-20 percent farmers follow natural service grade point will be 0,
As such, overall score for all practices was calculated and presented in terms of percentage of the maximum possible score.
Maximum possible score = Number of practices compared x 2

RESULTS & DISCUSSION

Farmers were asked about 30 organic practices including those relating to draft animals. The responses were collected and tabulated. The comparison of prescribed standards and practices followed by the farmers are given in the Table-1.

The table-1 shows that the practices of Indian farmers in terms of organic standards fetched 45 points. Whereas, the maximum possible point could be 60, when all compared practices are perfectly organic. So, in terms of percentage, the practices of livestock owners of study area were 75 percent (45/60 x 100 = 75) organic. Ironically, even with 75 percent of organic practices followed, the farmers of study area would not qualify as organic livestock producers since, some of the important principles of organic livestock production were not taken care of. As for example, feeding. Though most of the farmers (61%) fed their animals adequately but the source of feed was not organic in any case. This is the single most important factor which alone can disqualify the farmer's claim to be called 'organic'. Moreover, no farmer cultivated fodder crops and the animals mainly thrived on crop residues, which were not free from chemical fertilizers and/or chemical pesticides as the farmers used these in their crop fields. Similarly, the stocking rates in the study area are fairly high (3.99 cattle equivalent per hectare) in comparison to EU regulation 1804/1999, which is 170 kg/ha (Schmid, 2000).

According to the standards of organic livestock production, keeping of farm records is a must. Though the memory of Indian farmers in respect of inputs used and outputs obtained is quite amazing but they significantly failed to keep written records and none of them were used to keep any farm records. The farming practices, particularly the livestock farming is not yet looked as an industry by majority of Indian farmers, so they do not find any use of keeping records. Low level of literacy could be another factor for not maintaining the written records. Moreover, organic as an emerging system of production has not yet percolated down well to the level of Indian small and marginal farmers in many regions which is evident from the very low level of awareness on this aspect found in surveys at grassroots level (Pathak and Chander, 2001).

According to organic standards, draft animals must be well cared for and must be used in humane manner that causes least possible stress and suffering. As such, there should be some minimum and maximum age, with good health and no overloading and over work. The farmers were queried on the use of draft animals. The table- 2 shows that 71 percent farmers had draft animals with no significant variations between two categories (tribal and non-tribal) of farmers. 26.76 percent farmers who had draft animals beat their animals at work. In most of cases beating was done by a wooden stick. They just beat the animals to direct the movement of animals at work or to show fear to animals for better efficiency. 9.85 percent farmers confessed that they often overload their draft animals during urgent need but no farmers used sick animals at work. There was no difference between tribal and non tribal farmers with respect to these criteria.

With regard to average duration of work, the farmers used their animals for longer time in rainy season (7.09± 0.09hrs). Rainy season is the cultivation time for paddy as the area was rainfed so farmers invariably use the draft animals for longer time to finish the work as early as possible. During summer, the farmers generally used their animals in early morning or afternoon, thus, saving animals from excessive heat. As such, most of the farmers treated their draft animals in humane ways. Very small number of farmers beat them during work or overload them. The average time of work was also not so high. Thus, Indian farmers were well within the standards as far as following the welfare measures was concerned yet not qualified to be considered as organic farmers since they did not follow some of the very fundamental standards like keeping written record of farm production, adequate feeding of green fodder etc.

The objective measurement of animal welfare has remained an area of concern and considerable interest, thus, ways and means to develop objective assessment tool for the measurement of animal welfare even in conventional farm are increasingly being explored. It is argued and proved here to some extent that the standards developed for organic production may be used as valid and reliable tool since exhaustive and intensive exercises are involved in the development of these standards. These standards also leave scope for further modifications and improvement based on research and fields experiences.

CONCLUSION & IMPLICATIONS

Animal welfare is very important consideration in organic farming but internationally accepted, applicable and feasible science- based valid and reliable tool to measure animal welfare are not yet available. The OIE is working on this aspect through a task force set up very recently. Whereas, Organic standards can be used as a tool to measure the welfare of animals since the animal welfare is the very fundamental to organic livestock production and high priority is attached to it under organic systems of animal production. The organic standards are internationally acceptable mainly due to the systematic exercise followed in development of standards including the harmonization efforts. In this study, an attempt was made to measure animal welfare using organic standards developed by Government of India which are at par among others with IFOAM international organic standards. The animal welfare activists, institutions including OIE may consider using organic standards to measure animal welfare even in conventional or non-organic systems of production as has been demonstrated in this study. Also, the contentious issues related to organic animal standards in different countries may be addressed through harmonization efforts, workshops, regional consultations of stakeholders for consensus on such matters (Chander, 2004).

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Table 1 : **Comparison of Farmers' practices with organic animal husbandry standards**.

Sl.No.	Practices	What standards say	What farmers followed	Score obtained
1	Land holding	Landless animal husbandry not allowed	97% farmers had land with an average of 1.02±0.08 ha	2
2	Farm diversification	Farm should be diversified with respect to animals also, Monocropping is discouraged	All the farmers kept some animals besides agriculture. With respect to animals 87% farmers kept more than one species of livestock and 64% farmers kept 3 or more than 3 species	2
3	Free movement of animals	There should be access to sufficient free movement	96% of livestock owners provided ample access of free movement to their animals	2
4	Provision of fresh air and natural day light	Sufficient fresh air and natural daylight according to the needs of the animals should be provided	All the farmers provided natural daylight and fresh air to their animals, as there was no environment controlled house	2
5	Protection against adverse weather condition	Animals should be protected against adverse weather condition	97% farmers provided any kind of shed for protection against excessive sun light or rain. All farmers provided either wallowing, cold water, or ventilated sheds to protect against high temperature.	2
6	Resting area	Enough lying and/or resting area according to the needs of the animal.	93% farmers provided sufficient resting/lying area.	2
7	Use of bedding material	For all animals requiring bedding materials, shall be provided	Only 4% provided any bedding material to animals.	0
8	Drinking water	Ample access to fresh water according to the needs of the animals	All farmers provided sufficient water but 61% provided water from wells and/or tubewells, which could be taken as fresh for Indian condition.	1

9	Expression of natural behaviour	Adequate facilities for expression of behaviour in accordance with the biological and ethological needs of the species.	80% farmer kept their animals in flock with ample excess to free movement for all animals, practices like weaning, artificial brooding, artificial insemination were not followed by farmers. So, animals can express their natural behaviour pattern.	2
10	Grazing	All animals shall have access to open air and/or grazing appropriate to the type of animal and season taking into account their age and condition	99% farmers provided grazing to their animals	2
11	Mutilation	Mutilations are not allowed. However, the certification programme shall allow the exception like castration, dehorning, ringing, tail docking of lambs and mulesing	64% farmer performed castration and/or 4% farmer performed ringing. No farmers followed any other mutilation practices	2
12	Origin of animals	All the organic animals should be born and raised on the organic holding. However, when organic livestock is not available, animals could be brought from conventional farm at certain age.	As no farm in the study area was organic, so ignoring the organic criteria, it was observed that in 18% farms the stock was borned within the farm and in another 80% farm some borned & some were purchased, the purchase was mostly to replace the old stock. The place of purchase was within the region for 70% animals.	1
13	Source of breeding stock	Breeding stock may be brought in from conventional farm. A yearly maximum of 10% of the adult animals of the same species on the farm.	Females were within the farm but males were from local area for 100% farmers	2
14	Breeds	Breeds should be chosen About 96% farmers kept which are adapted to local condition	‘*desi*’ (local) breeds for all animals.	2
15	Reproduction technique	Reproduction technique should be natural	All farmers follow natural service.	2

16	Use of high technological and capital intensive methods like, embryo transfer, heat synchronization, use of genetically engineered species, etc.	Breeding shall not include high technological & capital intensive methods like, embryo transfer, heat synchronization, use of genetically engineered species etc.	No farmer used these techniques.	2
17	Adequate feeding	Animals should be fed adequately with balanced diet in a form allowing them to execute their natural feeding behaviour and digestive needs	Only 61% farmer fed the animals adequately & there was doubt about the diet whether balanced or not	1
18	Feed	Livestock should be fed 100% organically grown feed of good quality. If, certain feeds are not available then 10-20% conventional feeds are allowed	No organically grown feed was available	0
19	Source of feed	All feed shall come from farm itself or be produced within the region	What farmers fed to animals about 80% came from own farm, 10% from neighbour's farm and 10% from market.	2
20	Cultivation of fodder	No specific standard but say all animals shall have daily access to roughage.	No farmers cultivated fodder	0
21	Use of synthetic growth promoter or stimulants, synthetic appetizer, preservatives, colouring agents urea, farm animal by products to ruminants, animal manure or droppings, solvent extracted feed, pure amino acids, genetically engineered organisms.	These should not be used.	No one used these substances	2

22	Treatment for sick and injured animals	Sick and injured animals shall be given prompt & adequate treatment.	Though 90% of farmers used to given prompt treatment but as 60 of the farmers sought the help of ojhas, the adequacy of treatment is questionable.	1
23	Type of treatment	Natural medicines and methods, including homeopathy ayurvedic medicine and acupuncture, shall be emphasized.	50% farmers provided traditional treatment, 4% provided homeopathic and 46% provided allopathic treatment	1
24	Vaccination	Vaccine shall be used only when diseases are known or expected to be a problem in the region of the farm and where these diseases can not be controlled by other management techniques	73% farmers used vaccine in cattle and 20% in poultry regularly. Most of the farmers did not use any vaccine. As disease outbreak was reported in the area, non-vaccination is not against organic principles. So, the farmers are midway of standards	1
25	Use of hormone	No hormone should be used, except for treatment of individual animal.	Only 6% farmers used oxytocin for let down of milk.	2
26	Record keeping	All records of the farm in details including the receipts should be kept.	No farmer kept record of farm input, outputs or of treatment of animals.	0
27	Use of draft animal	Draft animals must be well cared, must be used in a humane manner that cause least possible stress and suffering. There should be maximum and minimum age, no over work or overloading	Use of draft animals was almost humane by most of the farmers but 19% farmers said they sometimes beat their animals and/or 7% farmers overloaded them	1
28	Use of child labour	No child labour should be used.	Only 6% farmers used child labour.	2
29	Equality of wages	No discrimination irrespective of colour creed and gender for same work	There was no inequality of wages.	2
30	Use of farm yard manure	Manure should be used in crop field after proper treatment.	72% farmers used manure in field and 19% used it in biogas	2

Table-2: Use of draft animals by Tribal and Non- tribal livestock owners

Sl.No	Particulars	Tribal	Non-tribal	Total	
A.	**Number(%) of livestock owner**				**ND**
	1.having animals for drafting	37(74.00)	34(68.00)	71(71.00)	0.55
	2.Beat their animals at work	6(16.21)	9(26.64)	15(21.14)	1.05
	3.Use the sick animals	0(0.00)	0(0.00)	0(0.00)	-
	4.Overloaded the working animals	3(8.10)	4(11.76)	7(9.85)	0.43
B.	**Average duration of works(hrs/day)**				**'t'**
	1.During summer	5.32±0.12	5.32±0.18	5.27±0.11	0.40
	2.during rainy season	7.03±0.14	7.17±0.10	7.09±0.09	0.76
	3. during winter	5.12±0.13	4.88±0.12	5.00±0.09	1.36

*Figures in parenthesis indicate percentage * indicate level of significance*

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Feeding Meat Chickens on the Grassland under Trees: Best Way to Organic Food

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1. Favorable conditions for chicken feeding on the grassland under trees in Guizhou Province

1.1Natural conditions

Guizhou Province is located in Southwest China, an area of low latitude and high altitude. Its average altitude is 1,100 m, its temperature mild (about 14℃-16℃ on the average); it has no hot summer and cold winter, with a frostless period of 270-300 days; its annual rainfall is 1,100-1,300 mm and its sunshine time 1,200-1,600 hours. Also, Guizhou is rich in fodder resources. There is an area of 4.3 million ha of natural grassland, of which the grassland under trees is 2 million ha. The main grain crops are maize, wheat and beans, and rape bran as a byproduct is a nice fodder for chickens. In a word, Guizhou Province is an ideal place for feeding chickens on the grassland under trees.

1.2 Ecological conditions

Guizhou Province is backward in economy, and its industry is under-developed. Pollution is light here. Also, most farmers use organic manure for crops. In 2002, the fertilizer use for a mu (about 0.06 ha) was only 10 kg, ranked the 25th in China. Also, pesticide is seldom used here. Therefore, the province is ideal for organic chicken feeding.

1.3Top-quality grass and poultry varieties

The lowest altitude of Guizhou Province is 137 m and the highest one 2,900 m, with a variety of pasture grass. The top-quality grass varieties are rich in natural grassland, over 260 ones to name herbal and legume species only. Most of the top-quality grass varieties in the world are available in Guizhou, such as white clover and lotus, wild grass species favorable for chicken feeding. Through long-time natural evolution and cultivation, the top-quality poultry resources are getting richer and richer in Guizhou, such as Chishui chicken, Qiandongnan chicken, Weiling chicken, high-leg chicken, low-leg chicken, golden chicken and yellow chicken. In recent years, the local experts have cultivated such species as Xiaoxiang balck-bone chicken, Zhuxiang black-bone chicken and Wumeng black-bone chicken. These chickens are delicious and are widely recognized in China.

2.History of development and present situation of chicken feeding on the grassland under trees in Guizhou Province

2.1 History of development

First, there was an application for the patent of feeding chickens on cultivated grass. Then, in July 2001, pilot projects were done in Zhijin County, Ziyun County, with much profit gained. Later, with the support of the Sino-Canada Project, the new method was extended in the province. In September 2003, the Provincial Government planned that there should be 200 bases of chicken feeding on the grassland under trees by 2010, with over 20 million chickens to be sold each year.

2.2 Present situation

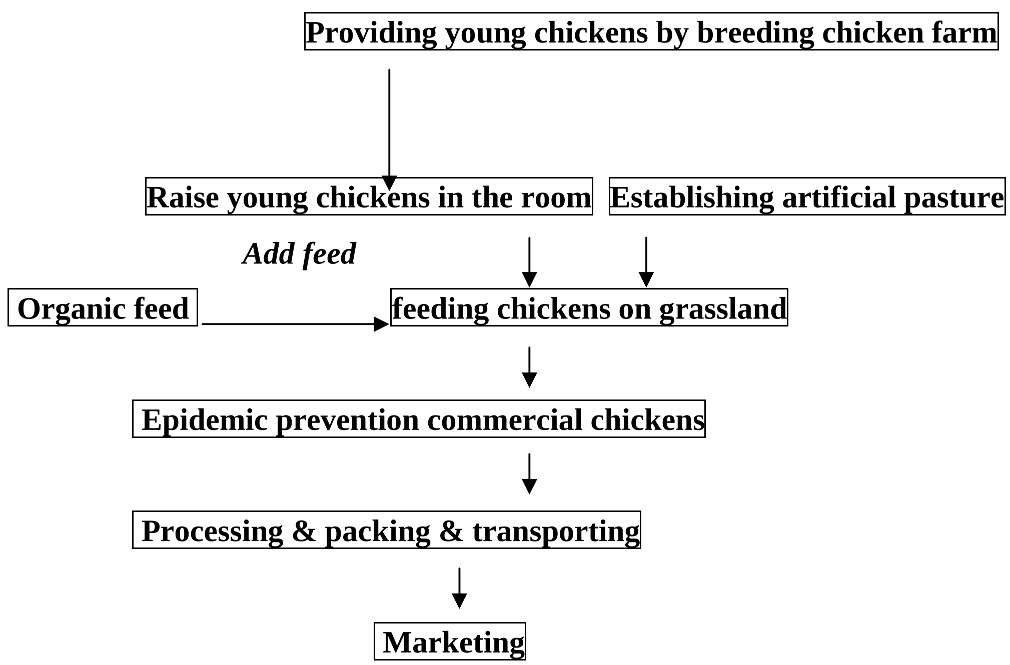
Since 2001, the patent applicants have improved the new technology. In 2002, National Bureau of Knowledge Property Right of China authenticated the new technology of feeding chickens on cultivated grassland. Through 3 years of hard work, the new technology has been extended in over half of the counties in the province by 2004, with over 3 million chickens sold each year. At present, chickens fed on the grassland under trees are considered to be organic food, and it is expected that 100,000 chickens of this type will have been sold at the end of 2004.

3. Technology feature for feeding organic meat chickens on cultivated grassland under trees

3.1Technology route

Establishing artificial pasture and improving ecological environment by means of trees—grassland—livestock model; providing hygienic and top-quality organic fertilizer though raising cattle and pigs and making use of theirs dung; improving soil to yield the raw material of organic feeds through applying organic fertilizer; feeding organic meat chickens on cultivated grassland under trees based on the demands of producing organic foods.

3.2 Process for producing organic meat chickens



Statements for process: feeding 1-day young chickens for 4 weeks in the rooms; feeding 4 week chikens on the grassland under tree during which add some organic feed; selling at their 16-18 weeks.(the whole course of marketing including slaugher, process, packing, stocking and transportiong will meet the demands of organic food.

3.3 Necessary technologies for feeding organic meat chickens

1) Establishing and making use of the artificial pasture well
2) Choosing and breeding top-quality chicken species
3) Feeding and management
4) Preventing and controlling epidemic diseases
5) Sectional rotation of grazing
6) Producing raw materials of organic feed
7) Making up organic feed
8) Protecting ecological environment of pasture feeding organic meat chickens
9) Processing and freshening chickens.

4. Feeding meat chickens on the grassland under trees: best way to organic food

4.1Benign conditions for the physiological and behavioral needs of chickens

The grassland under trees provides much space for the exercises of chickens, and because the density is low (450-750 chickens per ha), the living environment of chickens is favorable. Plus, chickens can enjoy enough sunshine and fresh air and thus have a strong anti-disease ability. Therefore, the grassland under trees is ideal for chickens.

4.2 Healthy feeding conditions

Organic food is incompatible with diseases. Chickens can enjoy much sunshine and many trace elements on the soil of the grassland under trees. Combined with much exercise and sufficient living space, chickens can become healthy.

4.3 Environmental protection by means of chicken feeding on the grassland under trees

Organic food is incompatible with pollution. The grassland under trees is pollution-free, and the rotational feeding does no harm to the grassland. Besides, chickens can eat worms or insects in the grass, and thus promote the growth of grass. Furthermore, chicken dung can add fertility to the soil. In this way, grass-chickens-grass model is established, which is good for ecology and sustainable development.

4.4 Quality of chickens

In the present society, consumers long for safe, delicious and top-quality food. It is proved that the chickens fed on the grassland under trees meet such demands. The quality and flavor of chickens are determined by species, method of cultivation and length of feeding. In China, the criteria for top-quality meat chickens are as follows: 1) Clear source for top-quality chickens; 2) Feeding on individual basis; 3) Over 100 days of feeding. In Guizhou, chickens for the project are top-quality species, on the low-density and individual feeding basis with 110-130 days of feeding.

4.5 Less grain consumption

The new technology is a reduction of grain consumption. With top-quality grass (mainly legume), the consumption of concentrated feed can be reduced by 30%, and economic returns are increased.

4.6. Easy for extension in rural areas

The new technology is of low investment and rapid economic returns. Therefore, farmers would like to accept it. They just select proper sites and purchase some simple equipment, and the new method is a way of using the local resources well.

4.7. Good resource of organic feed and production base

The ecological breeding method of Feeding Meat Chickens on the Grassland under Trees is mainly spread in the farm farmer's crop production based on the requirement of organic food, as the good forage of the chicken. We have good organic forage material resource. The local households are used to use the organic fertilizer, they seldom use chemical pesticide. So we have good resource of organic feed and production by means of this method.

5. Prospects of the new technology

The grassland under trees is 2 million ha in Guizhou Province. Also, its fodder for livestock is about 3.6 million tons each year. It is estimated that 10,000 ha of grassland under trees and 100,000-ton organic fodder can yield 20 million chickens as organic food. Therefore, the potentials for organic chickens are huge.

The chickens fed on the grassland under trees are delicious and pollution-free, and their market is promising. The chickens fed by means of the new technology are of low investment and quick economic returns, favorable for ecology.

We believe the chickens bred in this way will bring benefits to both farmers and ecology.

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Using Preventive Measures and Indigenous Technical Knowledge (ITK) to Control Livestock Diseases for Sustainable Organic Livestock Production: The Case of Mastitis in Dairy Cattle

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ABSTRACT : High standards for animal health and welfare are prescribed under the organic systems of livestock production. This is ensured through well defined set of standards for production and certification. The conventional therapies involving veterinary drugs are generally discouraged for their adverse effect on environment, animals and human beings who consume animal products. Thus, alternative treatment methods viz. homeopathy, ayurvedic, unani, Chinese systems of medicine finds place in treatment of various ailments and disease in animals. But such alternatives should be cautiously used since it may not only prolong the suffering to animal, adversely affect the productivity and quality of production but may also at times put life of animals in danger for the want of advance validation and standardization of such preparations. The present paper explains the importance of collection, documentation and validation of Indigenous Technical Knowledge (ITK) through the case of mastitis treatment in dairy cattle. Farmers in North India were found to be using it mainly when the conventional therapy involving antibiotic was not available nearby. In conventional systems, it may be accepted to use it without any prior awareness about its efficacy but under organic management it is essential that it should be properly validated and given to animals on the advice of the qualified veterinarian. The developing countries like India are huge reservoir of ITK which need to be properly documented and validated for their efficacy, side effects, cost effectiveness and environmental implications. This paper also emphasizes the importance of prevention in disease like mastitis which causes heavy economic losses and also affects the quality of milk. The herb tested through elaborate experimental protocols was found to be not so effective in curing mastitis but only helping reduce swelling in affected udders, thus, it is imperative to use other therapies or test more ITKs from different parts of the world so that an effective alternative to antibiotics commonly used in mastitis is developed. This paper highlights that ITKs should not be freely used in organic systems of livestock management but studied properly before put to use. Since mastitis is a major problem in organic as well as conventional dairy farms across the world, it was chosen to explain the concept of prevention and alternative treatment using the case of an herb locally known as bathua (Chenopodium album) in India. Besides, elaborate therapeutic studies were conducted by the author (Mukherjee, 2001), using aqueous extract of O.sanctum, alcoholic extract of Tinospora cordifolia and cell wall fraction of M.pheli, on 172 lactating crossbred cows at organized conventional dairy farm of Indian Veterinary Research Institute to see the efficacy of these preparations in comparison to standard antibiotic treatment (Enrofloxacin) for sub-clinical mastitis(SCM). The selected herbs were found to be effective against SCM. The active principle may be isolated through intensive R&D efforts so as to develop effective substitute to antibiotics which are the only available proven remedy for the treatment of mastitis in dairy cattle but harmful and expensive, thus, discouraged under the organic livestock production systems.

According to the organic livestock production principles, the emphasis of disease control is on health promotion based on a broad, holistic approach. One of the aims is to create a heard/flock and a husbandry system that minimize health and welfare problems by optimizing production levels and using suitable breeds and animals for the farm in question. Provision of feed and feeding and husbandry that promotes positive health is seen to contribute this aim as well. Another aim is to reduce the use of conventional, synthetic veterinary medicinal products both as preventive measures and in therapy of diseased animals (Hovi, 2001). As per EU legislation, individual animals that are treated more than three times in a given year with conventional medicine, loose their organic status. The use of conventional medicines is further discouraged by preferred use of alternative medicines, such as Phytotherapy and homeopathy, and by the requirement to use prolonged withhold times for products from animals medicated with licensed veterinary medicines. The standards of organic livestock production generally emphasise the need to minimize the use of conventional medicines by requiring the implementation of written health and welfare plans that allow for the evolution of a farming system progressively less dependent on allopathic veterinary medicinal products (UKROFS, 2001).This means more reliance on preventive measures and alternative medicines. But the standards also require prompt and effective treatment of diseased animals with best possible means since failure to treat sick animal may result to withdrawal of certification.

The alternative medicines, however, should be very cautiously used with proper testing for their therapeutic effect for the species of animals, and for the condition for which the treatment is intended (UKROFS, 2001). In the light of the restrictions set on conventional medicine use and the recommendations made on complimentary medicine, organic livestock farmers as well as the scientists and development workers are likely to explore the potential use of complementary and alternative therapies. Such non conventional methods may not be very poplar in developed countries but very common in developing and underdeveloped parts of the world. While such methods may be effective and widely used in conventional systems of production but their use may find very limited acceptance in organic production for the want of proper testing, validation and use by the qualified veterinarians who by and large are not trained on this kind of treatments. The treatment has to be done by or on the advice of the qualified veterinarians as per the regulations for the organic production. This calls for the thorough studies on therapeutic evaluation of the many herbal alternatives in use mostly in developing countries like India, before these are recommended for use in animal treatment. This paper deals with a case of validation of herbs in treatment of mastitis which is a serious problem in dairy cattle both in conventional and organic production systems all over the world. Mastitis is one of the most prevalent problematic disease of dairy animals, causes heavy economic losses in terms of quality and quantity of milk. The success in the control of mastitis is far beyond the satisfactory level due to complex multifactorial aetiopathology and multitude of microbial involvements .

How to Tackle mastitis?

Mastitis can be dealt with two ways: (a)Prevention by (i) hygiene, (ii) vaccination ,(iii) other measures, (b)Successful treatment/supportive therapy/recovery

Mastitis prevention by-

Hygiene: This is essential for breaking the cycle of disease. It is important to follow all of the principles of the Hazard Analysis Critical Control Points (HACCP) of efficient milk production as they apply to the milking process. This however is contingent on many things occurring, including: (i) adoption of a correct, regular routine at milking time, (ii)ensuring the optimum working of milking machinery/equipment, (iii)segregation of susceptible and infected dairy animals and milking infected animals in the last, (iv) regular, almost preemptive, microorganism(s) identification, together with antibiotic sensitivity testing in order to select the correct product. The antibiotic sensitivity testing is of critical significance in successful control. The dairy farmers often incorrectly use expensive antibiotics, by applying them against non-sensitive organisms. This often leads to many so called “antibiotic failures” and apparent drug resistance, etc. Microorganisms can pass on antibiotic resistance organism species, that may not even have any involvement in the current outbreak. Therefore, (a) the organism(s) should always be identified, (b)specific antibiotic(s), (if no other alternative available) recommended for control should be identified as well, (c)The recommended level and length of treatment should be followed, (d) In case of unsuccessful therapy, the milk samples should be reevaluated for the causative organism(s) and their antibiotic sensitivity, (e)The advice of professional advisor like veterinary doctor should be adhered to regarding usage of antibiotic and other health products, or any other relevant procedural modification like mastitis vaccination etc. (f) Special disinfection routines at each milking period should be strictly observed

The mastitis control programme should essentially be handled by qualified professional staff /veterinarian. For prevention, attention has to be paid to contamination and control measures at farm level viz animal sheds and environment, animal itself, milker and milk routine, milking equipment, storage and transport etc. The animal shed is one of the main sources of contamination. At the same time however, a good shed protects against micro-organisms as it keeps out other animals, people, wind, rain and excessive heat, all increasing the danger of contamination. Mud, urine, faeces, and feed residues should regularly be removed from the shed. The shed should have proper drainage, sufficient light and ventilation. In very wet areas, sprinkling slaked lime over the surface will help to dry it out quickly. The milking area of the shed needs special hygienic attention. The floor of the milkshed should be swept with clean water, and disinfected with one-percent bleaching powder solution. Facilities should be provided for a sufficient supply of safe and potable water for drinking, washing udders and flanks of the animals, utensils and milkers’ hands etc. The skin of the animal provides a large surface for possible contamination. Long hairs on the flanks, hind legs, tail and udder should be clipped at frequent intervals. If washing of animals is not practiced regularly as is observed in most cases, at least grooming of the animals should be done to keep the hair and dust away from milk. The udder is the part of the animal nearest to the milk and needs to be washed before each milking, and dried with a clean cloth or towel.

In the case of hand milking, the danger of contamination coming from the milker is higher as compared with machine milking. The milker should therefore be free from contagious diseases. Nails should be well trimmed; she/he should wear clean clothes and should wash her/his hands with soap and water before milking, then dry with a clean towel.A good milking routine prevents contamination of the milk. A consistent milking method at regular intervals, fast but gentle and complete milking, and sanitary methods during milking are all important aspects. Feeding roughage at the time of milking should be avoided. If the calves are suckling, the calf should be allowed to suckle at the beginning of the milking. The udders and teats should be washed and massaged for at least 30 seconds and dried prior to milking. Foremilk should be examined and abnormal milk should be discarded. The foremilk should not be allowed to run on the floor as this increases the danger of contamination. The milk should be drawn directly into the pail as fast as possible. The milkers should not wipe their hands on the body of the animals or on their own body.

After milking, the teats can be dipped or sprayed with a gentle antiseptic solution. The milking area should be thoroughly cleaned after each milking. Dirty milking equipment is one of the main sources of infection of milk. About 15 minutes before milking, milking equipment should be rinsed with a sanitizing solution. In this way, dust and contamination will be removed. Milking equipment should also be thoroughly cleaned after use because any milk residues in the equipment will allow microorganisms to grow rapidly. The utensils and equipment used during milking should be of standard quality. They should be made up of acceptable, non-absorbent, corrosion-resistant material and should be easy to clean. The utensils and equipment should not have any joints or open seams and should be free from dents, rust etc. The milking utensils and equipment should be thoroughly cleaned and sanitized after each milking. An acceptable, non-toxic and non-corrosive cleaning and bactericidal agent should be used for cleaning and sanitation.

After cleaning and sanitation, the utensils and equipment should be stored in such a manner and location to prevent contamination from flies, insects dust, dirt, rodents etc. They should preferably be stored in an inverted position off the ground to facilitate drainage of wash water. In many developing countries including India, knowledge of hygiene is often not sufficient. One of the most important support-services regarding clean milk production is “Extension-Education”. The ultimate aim of this service should be to develop the awareness amongst the milk producers towards cleanliness of milk shed, clean milk production and animal health care. These services should be organised at the village level and main thrust should be given to empower the women members who do the most of the animal husbandry related jobs especially the cleaning, feeding and milking comes under their domain in rural areas of India.

Treatment with antibiotics is the only proven remedy currently available to control mastitis in cattle. However, antibiotics have their own limitations in terms of cost, resistance, side effects and other environmental implications. Many newer generation antibiotics are synthesized but they are hazardous and produce resistant micro-organisms. Moreover, the routine use of antibiotics has led to consumer concerns in regard to food safety and an increased interest in organic dairy farming and the withdrawal of antibiotic use as a routine treatment especially in the organic dairy farms of UK(Weller and Davies,1998). As such, antibiotics are generally avoided especially under organic dairy farming systems. Under the organic management standards, it is imperative to maintain high standards of health and welfare. Conventional medicine is not used as routine but only as last resort. The alternative approaches, thus, are increasingly gaining attention including the use of herbal preparations (Mukherjee, 2001).

Weller and Cooper(1996) observed that the clinical mastitis is the main health problem for the organic dairy farmers in UK, where many cases were successfully treated with alternative remedies; however, on the majority of farms, antibiotics were used to treat the more severe cases. But the routine use of antibiotics has led to consumer concern in regards to food safety. Therefore, herbal preparations are attracting increasing attention for treating many ailments of man and animals mainly due to toxic and other side effects of many conventional drugs especially the antibiotics. Some herbal preparations have shown promising results against infectious agents, thus, have been reviewed by the author (Mukherjee, 2001a & 2001b) especially in context of Mastitis in dairy herds. If standardized, these preparations may prove to be a boon to organic dairy farmers which is going to be popular in coming years. Besides, the farmers in developing countries possess vast reservoir of ITK for various diseases of man and animals. These ITKs may be boon to organic production systems where many conventional treatments are restricted. For mastitis, many ITKs are in use in various parts of the developing world including India, where a great variety of ITKs are used for mastitis control. Such, ITKs, however, need to be properly collected, documented, validated and then made available for large scale use by the farmers.

The author has been part of one such validation exercise under The world Bank funded Mission Mode Project on Collection, Documentation and Validation of ITK. Use of Chenopodium album in bovine mastitis was one such ITK selected for study out of the several ITKs relating to treatment of animals identified for study (Table-1).

Table1: NATP- Mission Mode projects on Collection, Documentation and Validation of Indigenous Technical Knowledge

Sl.No.	Indigenous Technical Knowledge (ITK)	Importance of ITK	Results
1	Use of pigeon waste to induce estrus in post-partum anoestrous animals.	Infertility is one of the serious problems of livestock	QuIK survey and OFT revealed positive effect in inducing estrus
2	Use of Kasaundhi with turmeric, salt and mustard oil for treatment of dog bite in animals.	Wounds are common problem in animals	Effective low cost alternative
3	Use of Neem(Azardichta indica) oil in prevention of diseases and sun stroke in animals	Livestock suffer from many parasitic, bacterial and viral diseases and also by sunstroke during summer	Neem kernel and leaf oil revealed very high activity against E.coli & Staph. aureus
4	Use of Amaltas fruits for treating flatulence in animals.	Flatulence is common alilment	QuIK survey revealed Amaltas to be effective

			against flatulence
5	Control of Bovine mastitis using fermented Chenopodium album leaves as topical application – a validation study.	Antibiotics are the only proven available remedy against mastitis	C.album helps reduce swelling in masitic udders
6	Use of Tobacco, Gur and red chilies mixture in treatment of FMD lesions.	FMD is a serious disease causing high economic loss and vaccination is routinely required	Validation by QuIK and literature revealed that it helps healing of wounds caused by FMD
7	Use of Babool and Jamun bark in treatment of FMD lesions in animals.	FMD is a serious disease causing high economic loss and vaccination is routinely required	Validation by QuIK and literature revealed that it helps healing of wounds caused by FMD
8	Use of Peach leaves with fresh milk in treatment of FMD lesions.	FMD is a serious disease causing high economic loss and vaccination is routinely required	Validation by QuIK and literature revealed that it helps healing of wounds caused by FMD

Under the voluntary disclosure scheme, it was reported that in certain villages, C. album is used to control mastitis by the local farmers. To validate their claim, a study was designed among others to see if C.album has any role in controlling mastitis.

PRA & Field study

Nine villages viz. Khata, Bhandsar, Mudia, Mohanpur, Rithora, Kalapur, Purenatal, Dupeharia, Manda were surveyed. However, the use of Chenopodium to control mastitis was found only in one village (Latitudes 28.100N and 28.500N and Longitudes 78.580E and 79.470E). Thus, the study was restricted to this village only. Out of the 55 farmers contacted across the villages, 15 farmers from Purenatal villages were chosen for the QuIK study ( )as rest were not aware or had not used the ITK. Detailed discussion were held with the selected farmers about the mode of use, efficacy, cost effectiveness, side effects, constraints/availability, sustainability, treatment stage, application convenience etc. The farmers in general were not very enthused with this ITK as they believed that it is effective only in early stages of mastitis and its role is limited to only reduction in swelling. The farmers had good access to veterinary hospital and allopathic and homeopathic medicine in nearby town, thus, there dependence on ITK was not much. The use of Bathua was restricted to only a few farmers with only 2-3 animals. Matrix was developed to compare the efficacy of C.album in terms of reduction in swelling of affected quarters (Hrs post treatment) as also in terms of recovery in days Post treatment(PT) in comparison to Homeopathic and Allopathic treatment with which farmers were well acquainted. The farmers were asked to assign scores out of 10 to represent the utility of C. album as compared to allopathic and homeopathic treatments (Table2).

Table2: Efficacy of C. album vis-a vis homeopathy and allopathy against mastitis in cattle

Treatments	**Swelling control**			**Recovery**		
	<24 hrs	24-36hrs	36-48hrs	3days	5days	7days
C.album	3/10	5/10	6/10	2	4	6
Homeopathy	4/10	6/10	8/10	4	6	7
Allopathy	6/10	7/10	8/10	6	7	8

Observations on ITK being used by farmers

1) This ITK is in use in some villages in Bareilly district of Uttar Pradesh
2) Boiled paste of C.album when applied on the mastitis affected udder/teats of dairy animals reduces swelling
3) In early stage of mastitis, it is effective against mastitis specially in checking swelling
4) C.album is locally available cheaper substitute to Homeopathic and allopathic medicines but not as effective as the homeopathic and allopathic drugs to control the disease.
5) C.album is available mostly in winter season, thus, use is only seasonal.
6) Farmers do not depend on it alone but at times start with it, to be followed by Homeopathic/ allopathic medicines depending on the severity of the case.

Considering the above observations, it can be said that C.album may have some role in treatment of mastitis, may be in reduction of swelling.

Commonly known as bathua, wild spinach, Lamb's-quarters, pigweed is a nutritious leafy vegetable of the beetroot and palak family i.e. Chenopodiaceae. Chenopodium is a polymorphous, mealy white, erect herb, growing wild up to an altitude of 4,700 m and found throughout India. The herb is common in agricultural field. In the wild, plant is low growing, but when cultivated, is tall growing and leafy. The plant has a stem, rarely slender, often angled and striped green, red or purple. The leaves are dull green with a pale pink center. The leaf lamina possesses a waxy coating. Flowers are born in clusters forming compact or loosely panicled spikes in axils. The black seeds are slightly smaller than mustard seeds and have sharp margins. A perusal of literature also revealed the several other uses of C.album as follows:

Chenopodium album is a plant with multiple uses:

1) Food: It is consumed in a number of food stuffs. The tender shoots are eaten raw as salad or when cooked as green vegetable. Batua ka Parantha is a delicacy in North West India. 100 gms of leaves contain 3.7 gm protein, 0.4 gm fat, 2.9 gm carbohydrate, 150 mg calcium, 80 mg phosphorus, 1.74 mg vitamin A, o.4 mg Vitamin B2 (riboflavin), 0.5mg niacin and 3.5 mg vitamin C. The seeds are cooked like rice or oatmeal or sometime with dal. It also form an important source of food for livestock and poultry. As such, it is used in variety of preparations depending on the local taste and preferences.

2) Medicinal Properties: It has antiscorbutic, diuretic and nutritive properties. It has been used to treat various symptoms attributable to nutritional deficiencies like anemia. It is also said to have sedative and anti-refrigerant properties, thus leaves are also used to sooth burns. Poultice is used as topical application in headache or sunburn. However, no literature was available on use of Chenopodium to control mastitis.

Experiment(s)/ Experimental protocol

Phase I : In phase I study, 9 cows and 6 buffaloes were taken from commercial dairy farms around Bareilly city (Latitudes 28.100N and 28.500N and Longitudes 78.580E and 79.470E).
Phase II: 15 Lactating cows (5 Clinical cases., 9 Subclinical cases)were taken from Institute Cattle & Buffalo Farm, IVRI(Izatnagar)
Collection of plant material: The herb was collected from the local market
Preparation of the fermented paste of C. album green leaves: Leaves were washed under running water and made to a fine paste in the mechanical grinder. The paste was then put in a closed container for 48 – 72 hrs. for fermentation.
Application of the fermented paste over the diseased quarters: Nine hundred gms. of leaf paste /cow was thoroughly applied over the quarters and teats of the diseased udder once daily for 7 to 9 days depending upon the clinical recovery.
Collection of milk samples:10 ml.of milk was collected in sterile tubes before initiation of the treatment and 10 days post treatment.

Parameters Studied

1) California Mastitis Test (CMT)–CMT carried out before treatment & 10 days Post Treatment (PT).It was done immediately by the side of the cattle at the time of milking, by mixing equal quantity of milk and CMT reagent.
2) Somatic Cell Count- before treatment & 10 days PT. SCC was done by preparing milk smear over the clean microscopic slide and stained by NewMan's Lampert stain.
3)Bacterial Isolation- do- (Griffin et al, 1974)- Bacterial isolation was done in bovine blood agar and on Tryticase agar.

The CMT point score, SCC and bacterial isolation in response to C. album treatment in lactating cows presented in Table3, 4 and 5.

Table3 : CMT point score in response to the application of C album in clinical / subclinical mastitis (Cattle) Phase I

N= 9	**CMT point score**	
S.N.	0 day	10 days
1*	3+	2+
2*	3+	1+
3**	4+	0
4**	3+	0

5*	2+	1+
6	1+	1+
7	1+	1+
8	1+	0
9	1+	0

Explanation
CMT(3+& 4+)- clinical mastitis
CMT (1+& 2 +) – subclinical mastitis
*Cows treated with vit E / selenium and lime.
**Cows treated with Enrofloxacin.
CMT point scores reduced to normal in 50% cases in response to herbal therapy

Table 4: Somatic Cell Count in response to C album treatment in clinical / subclinical mastitis (Cattle) .

N = 9	**SCC x 10 5 cells / ml of milk**	
S N	0 day	10days
1	48	31
2	46	19
3*	57	-
4*	53	-
5	26	17
6	13	14
7	17	11
8	21	9
9	19	12

Table 5: Bacterial isolation from the mastitic milk samples (Cattle).

N = 9	**Isolation of the microorganism from the milk samples**
S N	0 day
1	Streptococcal sp.
2	Staphylococcus sp.
3	Staphylococcus sp.
4	Collibacilli
5*	-
6*	-
7	Collibacilli
8	Micrococci
9	Streptococcus sp.

- Samples damaged.

CMT point score, SCC and bacterial isolation in response to C.album treatment in Buffaloes.

Table 6: CMT point score in response to the application of C album in clinical / subclinical mastitis (Buffalo)

N= 6	CMT point score	
S.N.	0 day	10 days
1*	4+	0
2*	4+	0
3*	4+	0
4**	2+	0
5***	1+	0
6***	1+	0

CMT 4 (+) – clinical mastitis,CMT 1(+) and 2 (+) –subclinical mastitis
* Buffaloes treated with enrofloxacin,**Buffaloes Treated with E care.
***Buffaloes treated with lime(6 – 7 limes per animal fed orally for 3 days)
The CMT scoring returned to normal by herbal application after 10 days PT

Table 7: Somatic cell count in response to C. album treatment in clinical / subclinical mastitis(Buffalo) .

N = 6	SCC x 10 5 cells / ml of milk	
S N	0 day	10 days
1*	42	-
2*	39	-
3*	35	-
4**	27	12
5***	21	9
6***	19	7.5

* Clinical mastitis shifted to standard antibiotic treatment.
Significant reduction in SCC was observed 10 days PT

Table 8: Bacterial isolation from the mastitic milk samples (Buffalo).

N = 6	Isolation of the microorganism from the milk samples
S N	0 day
1	Streptococcal sp.
2	Staphylococcus sp.
3	Collibacilli
4	Streptococcus sp.
5	Collibacilli
6	Collibacilli

Phase II
(IVRI, Cattle & Buffalo Farm, LPM Section) – N = 55 cross- bred cattle

Table 9 reveals significant reduction in CMT point scores as observed on 10 days PT.

Significant reduction in SCC was observed 10 days PT, with the application of herbal fermented paste on the mastitic udder.
Important findings
The paste of C. album was found to reduce the edematous swelling in the infected gland.
The paste was also found to reduce the blood in the milk.
It shows some efficacy in sub clinical mastitis when used alone.
The efficacy of the paste increases when used along with lime and Vitamin E/ Selenium.

Table 9: CMT & SCC Scores in buffalo milk in response to C. album therapy

S. No	Parameters studied	0 day PT	10 days PT
1	CMT point scores 0 – normal milk 1-2 - subclinical mastitis 3- 4 – clinical mastitis	3 – 4 point score	1 – 2 point score
2	SCC x 10 5 cells / ml of milk < 500000 cells / ml of milk in normal milk > 600000 - 2300000 cells / ml of milk in subclinical mastitis > 2500000 – 1 million cells / ml of milk in clinical mastitis	17 – 46 lacs cells / ml of milk	12- 32 lac cells / ml of milk

__**Experimental protocol for Phase III**__

In vitro antibacterial sensitivity of C.album leaf extract.
Preparation of extract:
1) Prepartion of acquous extract
2) Preparation of ether extract
3) Preaparation of ethanolic extract
4) Preparation of Methanolic extract

Further studies to be taken up
The In-vitro antibacterial sensivity will be evaluated by taking different concentration of the drug in various extracts against pathogenic microorganisms isolated from the mastitic milk by taking standard antibiotic as control.

Conclusion

It is concluded from the present drug trial, that the paste is not effective singally in clinical mastitis , but can be given as adjunct therapy along with vit C and E. The application of the

Chenopodium paste reduces the swelling and pain in the inflammed udder, the herbal paste also cures blood in milk indicating its anti-inflammatory potential.

IMPLICATIONS OF THE STUDY

A large number of ITKs are in use for many different ailments of man and animals all over the world with little to significant positive effect on treatment. As per the standards of Organic production, however, it is not allowed to use these ITKs without first standardsing their effects including the side effects following thorough scientific procedures. This paper only highlights the importance of validation of ITKs before these are recommended for use in organic dairy farms in particular. Prevention is better than cure, hence, efforts should be made to prevent diseases by following hygienic practices in the dairy farms. If disease still occurs, alternative but tested methods should be applied with the advice of qualified veterinarians than only one should move towards using conventional medicines like antibiotics etc which are harmful and hence, should be avoided as far as possible but not at the cost of the suffering of the animals for longer durations. This paper is an attempt to highlight the importance of ITK, preventive measures, and scientific procedures to test the claims of ITK so that a pool of knowledge can be developed for organic dairy farming in particular.

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ORGANIC BEEF AND ORGANIC FEED IN AUSTRALIA

An overview of Organic production in the semi arid zone

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The organic beef industry in Australia is characterised by a great diversity of operations but is dominated by the extensive rangeland systems of the North and the West. Cattle feed production is predominantly based on natural herbage, but this cannot always be described as "grass" Inspection and certification of these systems that represent the largest certified organic area in the world are carried out by Australia oldest organic certification organisation, the National Association for Sustainable Agriculture, (NASAA)

The following paper attempts to describe an organic system that exhibits substantial variations in practice from the typical Northern organic systems of Europe and most other systems but still displays adherence to organic principles.

The Range of bioregions where organic agriculture has been established in the latter portion of the 20TH Century include the great expanses of Australia's dry and wet tropics and the semi arid zones. These regions have undergone more or less rapid periods of perturbation in the last 50, 000 years and in particular have been subjected to rapid exploitative changes in the last 200years that have resulted in the removal of many species and the introduction of an even greater number of both wanted and unwanted exotics.

Climate change has certainly influenced on the longer scale but the hunter/gatherer aborigines may been the most influential in shaping the systems from those dominated by grazing mega fauna to those dominated by fire[1].

More recent patterns of grazing and the introduction of new fauna and flora characterised by rabbits, foxes, pigs, goats, camels and horses and a variety of grasses, trees and shrub species some of which are now deemed as pests

The cattle grazing industry was started over a century ago Patterns of land management since then have changed as new understanding of ecological processes is developed Grazing can seldom be associated with a single species such as cattle but is inevitably a product of a range of

[1] Flannery. T 'The Future Eaters"

competing species, the domesticated cattle, feral animals and native animals typically the kangaroo.

It is the nature of the Australian environment with the exception of a green rim on the south to experience wide fluctuations in climatic conditions brought about by the el Niño and known As the Southern Oscillation index. Today, as for millennium nature and now man must govern their activities based on the innately seasonal uncertainty that results in what may be described as ephemeral environments. No more ephemeral environment may be noted than that of the cooper basin, the home of the OBE organic beef industry which encompasses a collective are3a of over 5 million certified hectares.

The characteristic uncertainty oven rainfall is more than the typical uncertainty of all farming, but is almost certainly uncertain. It is against this backdrop that the basis of organic rangeland management is located and against this same backdrop that the organic standards and certification system of NASAA operates.

The land and soil.

Landforms and soils vary greatly, but a re typically of a flat to moderately undulating nature with sometimes dramatic faults and a wide range of sand hills. Where floodplains dominate, lands are flat and uniform and punctuated by ephemeral watercourses. The soils vary widely as would be expected from the pure sand ridges through gibber plain to clay pans and deep alluvial sediments on the flood plains. Decomposers include earthworms in some locations and times, but are typified by termites which play a critical role in recycling the highly carbonaceous woody wastes.

Soil conditions are not measured using the same criteria as many well watered organic farms, where organic matter and nutrient levels are high but by levels of compaction, ground cover and stability. Organic practices are aimed at maintaining adequate cover which may vary according to the capacity of the soil and the climate cycle. Inherent in the organic management is the capacity to address this vital soil cover and here, at least three methods are used.

1. Monitoring
2. Stock rotation and removal at critical times
3. Water point management
4. The non use of urea to facilitate stock utilisation of dry feed

The vegetation

A wide variety of vegetation can be found in these areas and despite the general belief that the grazing takes place in a near desert; nothing could be further from the truth. Ground covers include forbs and succulents which form the majority of the diet of the organic cattle Grasses include the Mitchell grass and some introduced grasses from Africa. Shrubs and trees include Eucalyptus, acacia, Casuarina and many others

Unwanted vegetation is part of the heritage of Australia's last two centuries and the arid zone is not spared. Whilst organic certification does not discriminate between native and exotic vegetation in farming system, where invasive species threaten ecological functions and unreasonably discriminate against grazing operations, national laws make it a requirement to manage these plant pests. The organic farmer is required to this, and may not apply chemicals to plants or infested regions. The disqualification of the farm or subsection of the farm from organic certification makes pre-emptive management a priority, but where no other solution exists, some farmers may remove areas from certification following advice of the mandated control of a pest plant using herbicide.

The feeds

The principle feeds are derived from the succulents and forbs and grasses and some shrubs and tree fodder make up most of the remainder. Because urea is not fed, supplementary fodder includes hay and copra meal imported from local and overseas organic sources.
Minerals and nutrients. Phosphorous is usually deficient in Australian circumstances and is fed as a supplementary mineral. Trace elements such as zinc are fed in stock licks which are not permitted to contain urea or ingredients from GMO sources such as cottonseed oil

The animals

Animals are a combination of boss indicus (Brahmin) and Boss Taurus (Hereford and shorthorn) The pure breeds of each are kept in addition to new hybrids such as Santa Gertrudis and Braford. Even pure English breeds are well adapted to the hot dry conditions, although breeding for eye cancer resistance is important in English breeds. The other grazing animals are also managed through adjustment of total grazing pressure and include predominantly kangaroos. Camels, horses and goats are also present.

Water

Water is the most unpredictable element in the production environment. It determines the boom or the bust and may be absent in the form of rain for some years. The following weather announcement from the web illustrates the dynamic nature of floods

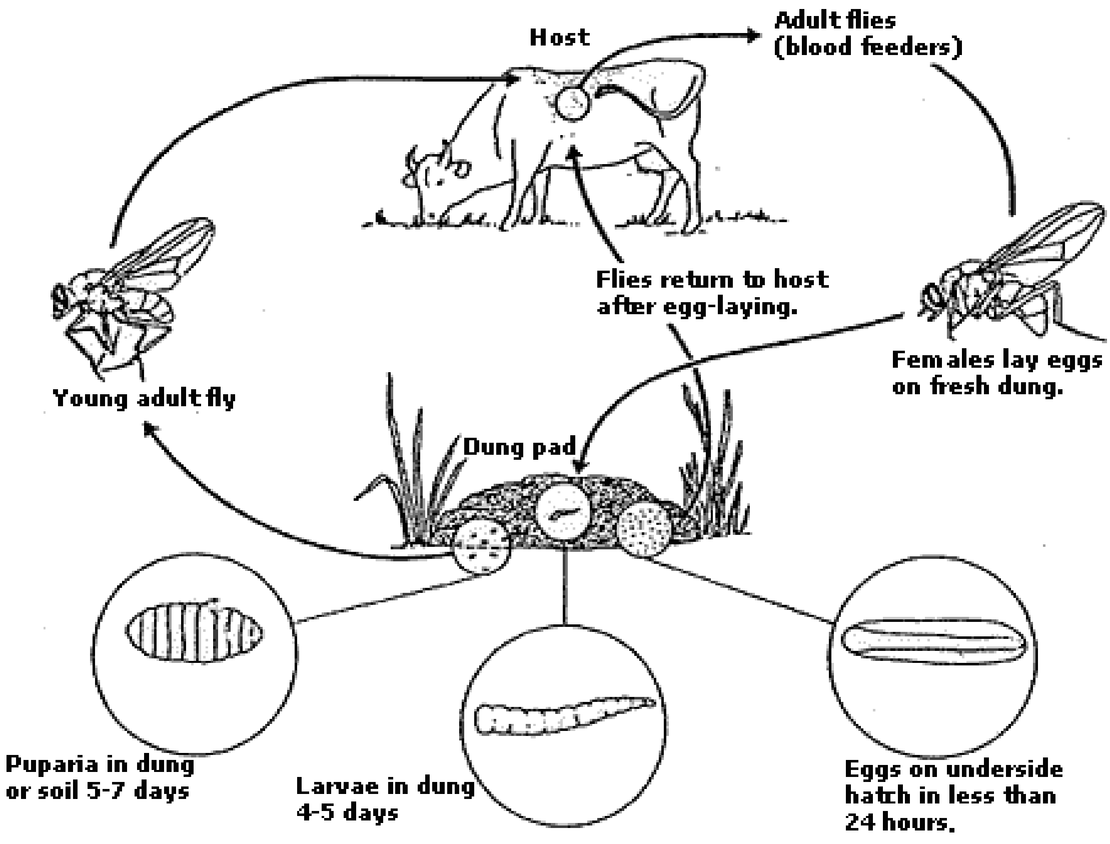
FLOODS AND RAINS BENEFIT WESTERN QUEENSLAND.
Monsoonal weather patterns during February and March have provided beef producers with an excellent base for natural fodder production. Some parts of Western Queensland received in excess of 400mm (16 inches) during a 10 day period. The famous Channel Country Rivers such as the Paroo, Bulloo, Thomson, Diamantina and Coopers Creek have all enjoyed large flooding. Some sections of the rivers flooding out to 30kms across.

Artesian water is the other major water supply, and whilst not sufficient for irrigation, provides life giving stock water. The management of the artesian waters is critical and total pressure has dropped over the past 100 years from untapped wells that run freely. As a result, certified organic operators must install taps on any wells to prevent water wastage. The placement and management of water points is closely linked to land management and permits maintenance of "no cattle zones "for additional biodiversity value when placed beyond walking distance.

The pests and diseases including predators and parasites

Pests are animals, plants and insects. The principle vegetative pests include "Parkinsonia" and "Mesquite". Plague locusts are also common and swarmed this year. Fungal spore rather than chemicals are sprayed by the Australian Plague Locust Commission on organic lands, thus maintaining organic integrity
A range of plants that become poisonous at time of their annual cycle must be avoided through rotational grazing.
Feral pigs destroy natural wetlands and foxes prey on native species. Dingos and dingo crosses are also problematic for producers ands will prey on young claves, although they are not as susceptible as lambs. The chief method of control is via the famous dingo fence. The government may mandate culling of ferals from time to time. Trapping and baiting are used for this purpose.

Normal internal parasites in cattle are generally not encountered. Low stocking densities (as few as one beast per 100ha in some times) and browsing rather than close grazing help explain this. The chief parasite in Buffalo fly, encountered in wet periods.



Organic operators use strategically placed physical traps to control these parasites

Animal Welfare

Very little handling of animals takes place. Castration is carried out below 6 months of age and hot branding. (It is difficult to manage liquid nitrogen in the outback). Serious illness or injury is usually treated through humane culling. Yards and yard design are critical factors in ensuring animal welfare and will typically include shaded areas and provision of overhead sprinklers to reduce dust levels. Elimination of protrusions capable of causing injury and well designed loading facilities make handling both humane and easy.

Contamination.

Contrary to popular belief, the remote locations of Australia that have been used for livestock production in the past are not free from historic chemical contamination, although sources are point sources rather than being diffuse ones. Old stock yards especially those used for sheep are the hot spots with evidence of organochlorines and arsenates widely found in testing. Operators are required to bury or remove any contaminated material before those areas can again be used for production. Most operators cover the soil surfaces and permanently fence them , relocating organic handling facilities to new locations.

Biodiversity

Biodiversity is the one of the most fundamental indicators of organic integrity. Operators must monitor and record the seasonal profiles of a selected number of locations on the farm. These are photographed and inspected. In addition, areas are fenced off precluding cattle grazing and used as reference points to monitor vegetative cover.
Operators are not permitted to clear native vegetation, but importantly must have a destocking strategy in place and a procedure to destock when conditions deteriorate due to lack of (or in some times too much) rain
Operators must retain at least 5% of their farms in a natural or semi natural state, but in fact, with managed grazing, practically the entire farm is maintained in this way

Animal identification

The organic standards are supplemented by the NATIONAL LIVESTOCK IDENTIFICATION SCHEME (NLIS) ,which is Australia's program for the identification and tracing of livestock. It is a permanent identification system that enables individual animals to be tracked from property of birth to slaughter. NLIS uses Radio Frequency Identification devices in the form of an ear tag or rumen bolus/ear tag combination to identify cattle. Every animal gets a unique electronic ID.

These electronic ID devices can be read as the individual animals move through the livestock chain. Producers are able to record each animal's information on personal computers. This information is then downloaded and stored in the secure central NLIS database.
It is this centrally stored electronic history of an individual animal's residency that enables rapid and accurate traceability.

At the OBE beef organisation, at the time of slaughter, a small sample of tissue is taken from each carcase. This sample provides a unique DNA profile of the animal. The data is recorded using computer-based technology and the meat is tracked as it moves through the processing chain.

Transportation and movement of stock

Transport and movement of stock involves the muster where the use of lead shot is banned. After muster, livestock are transported in road train to organic abattoirs that may be some days distant. They are stopped at certified resting points for a day or two before being moved on the completion of the journey. Only organic feed is provided from beginning to end of this final journey.

The inspection and certification system

The NASAA inspection and certification system is accredited by IFOAM, the Australian Competent Authority (AQIS) to ISO 65 and is listed with the EU.

Conclusion

The production systems of the semi arid zone in Australia vary greatly from the many other organic systems in the world, yet still mange to bring dramatic improvements to animal welfare and land management under the Norms of organic management. Contrary to some belief, organic management systems in these regions vary considerably too many historic systems of management and have been applauded for their contribution to more sustainable farming. These activities conducted under the rules and systems of organic farming support the case that gaps in harmonisation between standards are less than imagined and incompatibility of organic guarantee systems with world trade in organic products may be less than significant.

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Techniques in Producing Organic Foods

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1. Introduction

Food self-sufficiency was a national problem to be solved in the 1960s. Since then, the Korean government established modernized system for agricultural research and extension service. The government developed and disseminated techniques to increase food production and attain food self-sufficiency as well as move into the Green Revolution phase. The effective and efficient management of the Korean economic development led to incredible increase in production. While demand for fruits and vegetables increased, so thus, supply also increased. Consumers then were greatly satisfied with the yearlong production. However, nowadays consumers prefer to select high quality agricultural products, thus agricultural techniques are now being focused on quality produce through precision agriculture with low input and that also make use of environment-friendly techniques such as organic and natural farming and others.
How then can agricultural product be environment-friendly and safe? What kind of produce can be environment-friendly? Considering low input from synthetic fertilizers and pesticides, one can deduce that these food products were produced through integrated nutrient management(INM), integrated pest management(IPM) or the precision agriculture techniques. These management techniques are adapted to soil and crop. Specifically, these products are from organic farming that used natural raw materials; and thus are safe products.
Most developed countries already established and managed their own standards or guidelines for safe agricultural products. The Korean government has also created and has effectively implemented laws and regulations to promote environment-friendly products. Since 1997, various project and activities were implemented through for National Agricultural Products Quality Management Service(NAPQM). One such activity was the quality certification criteria that classified safe products into low input pesticides, pesticide free, and organic agricultural products.

This paper thus discusses and compares CODEX standard and domestic techniques in producing organic foods.

2. International standard in producing organic foods

○ Appropriate plant species and varieties
The plant species and varieties should be appropriately selected to consider soil, climate, and pests or diseases. Seeds or vegetative reproduction materials for organic farming should not be treated by any their chemicals. If the chosen material is not available, seeds and vegetative reproductive materials which are no treated with substances and are designated by the authority

should be used instead. However, genetically modified seeds, pollens or plants should not be selected in all occasions.

○ Conversion period
An organic production system can be established in any existing farm through a period of conversion. The appropriate length is determined by site-specific factors such as the history of the land, type of crops planted and other factors. The minimum period of conversion is 36 months after terminating use of the prohibited materials.

○ Fertility and biological activity in the soil
Soil fertility can be maintained and enhanced by optimizing soil biological activity and mineral nature in the soil. This system well provides a balanced nutrient supply for the plant that at the same time conserves soil resources. Specifically use of heavy metals that may accumulate in soil must be avoided. fertilizing and conditioning substances from stone meals, farmyard manure or plants must be used considerably to maintain adequate pH needed by soil. The standard level and total amount of fertilization should be established by the certification body or authority considering the characteristics of the region and crops to be cultivated.

○ Management of insect pests and diseases
An organic production system should utilize management practices that can minimize harmful effect of pests, diseases, and weeds. The system must utilize a diverse mix of mutually dependent life form and recyclable plant and animal residues. Crop selection and rotation, companion planting, tillage, and cultivation of green manures must be employed. Mechanical cultivation such as steam sterilization can also be used. The use of the synthetic growth regulator, genetically modified organism(GMO), or its by-product are no allowed.

○ Management of weeds
The weed control principle set out in the organic farming should be biological or cultural in nature. Use of sorted seeds, choice of appropriate species and varieties, appropriate rotation program, and mulching and mowing should be employed. Specifically, cultivation crops such as barley, oats, soybean, and others are encouraged since they can compete with weeds. Weed control may be achieved by planting winter or spring varieties, controlling sowing season, and utilizing biological materials such as beneficial insects, microbes, or animals.

Minimizing pollution
In order to minimize air, soil, and water pollution, the maximum permissible level of pollutant in organic agriculture should be established. If there is rational doubt about the contamination, whether air, soil, or water, the inspection process should be undertaken by the certification body or authority. The protective substances for covering, vinyl mulching, or nest of insect may only be applied with polyethylene, polypropylene or polycarbonate materials. These substances should not be burnt but removed from soil after the use.
Fertility and biological activity of the soil should be maintained or enhanced by crop rotation and green manures utilization. Theses activities would allow biological resources to be reduced to the agricultural system and thus increase utilization ratio of fixed nitrogen. The appropriate choice of resistant varieties should be able to minimize stress or harm from diseases or environment.

Organic agriculture can be achieved if each of the techniques will be combined and developed to harmonize application.

3. Techniques in organic farming in Korea

Organic farming concepts have been developed in Korea for a long time now. This has evolved through time as people recognized the importance of pesticide and synthetic fertilizer free products. The quality certification of agricultural products was initiated in 1993 for organic and pesticide-free products. This quality certification needed to define organic farming and the development in Korea of their technique. Most of these techniques have been developed and disseminated in Korea. Information on organic on organic farming is now widely used by farmers.

○ Choice of variety and conversion period
The criteria in the choice of variety depend on the needs and preference of consumer. Factors to be considered are quality, taste, flavor, and nutritional values. Seeds for organic farming are not sold in the market. Seed production from seed gardens in organic farms has been tried by some farmers. Thus, the authority must provide support to maintain enough seeds for organic farming. Otherwise, the country may depend on imported organic seeds.
The use of genetically modified seeds or vegetative reproductive materials is prohibited in organic farming. Proper labeling or identification of GMO is therefore needed. This system would secure the use of genetically modified seeds or vegetative reproductive material in organic farms. It is thus imperative that Korea would adopt a labeling inspection system of the seeds or vegetative reproductive material for organic farming. The conversion period of at least two or three is applied in organic farming system. This is also intended to allow organic fertilization of the soil. The organic farming certification system that measures the soil fertility.

○ Soil fertility management

(1) Crop rotation
Crop rotation is encouraged in organic farming to prevent the decrease in yield as well as avoid nutrient deficiency in crops. Crop rotation also disrupts the life cycle of pests, disease, and weeds. The rational application of this cropping system contribute to the fertility and the biological activity in soil through nitrogen fixation that increases the organic matters and nutrient mobility in soil. This prevents soil erosion through aggregation of soil structure.

(2) Soil diagnosis
In developed countries, the precise diagnosis of the soil and plant and the site-specific supply of nutrient for the nutrient for the nutrient balance have already been achieved in organic farming. Most of organic farms in Korea may depend on organic substances or these organic farms. Recently, wastes from cattle are used rather than chicken or pig wastes since it contains low quantity of phosphoric acid. This minimizes the accumulation of phosphoric acid in soil. Some annual leguminous plants such as soybean, peanut, and perennial leguminous plants such as alfalfa, clover, and milk vetch can be used sufficiently s a nitrogen source instead if livestock

wastes. The accumulation of phosphoric acid and the alternative use of leguminous plant as nitrogen source.
The establishment of the system for soil diagnosis and its application to the organic farming will be achieved through database establishment. This would include information on the kind and quantity of the organic matters treated, the constituents and their contents, and the change of soil after treatment.

○ Pest control
One major advantage of organic farming is maintaining a healthy soil. Various microorganisms in healthy soil can suppress the population of pathogenic fungi or bacteria. In order to maintain healthy soil, crop rotation and planting of the resistant variety may be combined with rational techniques for pest control. Site-specific characteristics such as climate, altitude, location, fertility, and ventilation of soil may affect the outbreak of pests or disease.
Effective techniques for pest management are being developed in organic farming using parasite or parasitoid as natural enemies, microbial pesticides, and semiochemicals. Also, a sanitized management of field and improvement of culture are being utilized.

(1) Biological control
It is important to utilize natural enemies thriving in the ecological system near the organic farm to maintain pest population that is below the economic injury level. In order to achieve this purpose, domestic resources of natural enemies should be preserved and trials in developing biological pesticides should be carried out cooperatively by the company and the research institute. The following biological control practices are being adopted: 1) using pathogen inoculum through antagonistic microorganism; 2) protecting and introducing natural enemies; 3) mass production and augmentation of natural enemy; and, 4) improving environmental condition suitable for natural enemies.

(2) Cultural control
Determining the feeding preference of pests to plant varieties or planting resistant varieties are also important techniques to control pests or disease. Specifically, pest population can be decreased by sanitizing the field by mowing or removing crop residues in which pests may propagate or planting distance. The following cultural control practices are being adopted: 1) plowing; 2) crop rotation and multiple cropping; 3) avoiding pest damage; 4) arranging plant density; 5) removing alternative host and plant residue; and 6) field sanitation.

(3) Chemical control
Synthetic attractants and repellents such as naphtalence or dimethyphthalate which are not harmful to other organisms except for the insect pest species can be used in organic farming. These novel pesticides contribute to the development of organic farming. However, their effective use is dependent on the adequate monitoring techniques about the occurrence periods and life cycle of pests.

○ Weed control
Most weed control may be carried out through manual or machine mowing. However, suppressing weed germination is more effective since it doesn't require too much lbor. To

control weed, cover plant or irrigation before crop planting has been practiced for a long time. Also, drip-watering or burning weeds are useful techniques. However, these practices require too much labor in organic farming.

In addition cropping system such as mulching may influence the occurrence of weeds. The polyethylene and polypropylene are designated as approved mulching materials in the international guideline for organic farming. In this case, mulching materials should be removed after use and should not be burned in the farm fields.

The basic techniques of weed control in paddy fields are: 1) water management; 2)non- or minimized- tillage; 3)mulching or use of cover plant; 4)use of allelopathy; 5)use of biological herbicides; and, 6)allowing animals to feed on weeds.

For example, maintaining 12-15 cm of water depth can suppress the growth and development of Echinochloa crus-galli and other weeds in paddy fields. In other areas, cover plants can increase the movement of water and nutrients to the surface soil and thus, increase the soil pore while decreasing the soil loss. These are useful as a habitat for some beneficial insects. When a plant grows or withers in soil, it releases some chemicals that suppress other plant species. This process is called allelopathy of chemicals and biological pesticides. The method is very effective in weed control in organic farming. However it is impractical to use due to difficulty in mass production. Allowing animals such as goats, sheep, geese, fishes, and ducks are also carried out. However, measures should be worked out for the breeding, application ad sale of the animals.

4. Conculsions

The stable production of organic food produced in Korea should be according to accurate and appropriate certification in organic farms in considering regional condition such as alpine region, reserve for drinking water, clean area, farming scale, and other factors. The following must be considered in organic farming:

- Development of various seeds or vegetative materials suitable for organic farming;
- Promotion of a circulation system of the organic resources in paddy and upland fields;
- Development of cropping system using leguminous plants for crop rotation;
- Practical use of crop rotation, companion cropping, and intercropping;
- Use of alternative pest control methods and materials instead of chemical pesticides; and
- Management of weeds to save an labor and use of biological control such as pathogens.

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EMPLOYMENT GENERATION IN RURAL SECTOR BY USING ORGANIC AGRICULTUREHOOD

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Agriculture is in a bad shape in all the countries, particularly the developing ones. Growth rate in food production has declined significantly in the 90s. Public investment in agriculture and credit deposit ratio in rural areas is on the decline. Rural poverty is very high amongst scheduled caste, scheduled tribe and agricultural labour household. Employment growth was much lower in the 90s as compared to that of the 80s. Growth in agricultural employment is almost zero. In 1999-2000 poverty ratios were 36.09% in Assam, 42.6% in Bihar, 37.43% in Madhya Pradesh, 25.02% in Maharashtra, 47.15% in Orissa, 31.15% in Uttar Pradesh & 27.02% in West Bengal. The poverty has many dimensions and income poverty is only one of these. Hunger and access to Health and education are other manifestations.

In the past, the industrial location policy ensured that job can be created, where the workforce was. Now the attitude has been turned opposite down. Jobs are now created, where facilitating environment exists and these jobs will increasingly be private sector jobs, where a high investment is presently needed to create a job opportunity.

At the time of independence, 77% of the population was dependent on agriculture and now this is down to 69%, which is substantial. Hence a large growth in agriculture is very much needed for a large chunk of population. The share of agriculture in national income is declining. In 1980 it was 38%. The share is declining progressively to 31% in 1990 and the share was 24.7% in 2001. We, however, observe that the decline in the number of people dependent on agriculture has been only marginal. The farmland area is also decreasing, which will be apparent from the following table:

Farm land area under production of food grains:

Year	**Area** (Million ec.)
1998-1999	125.17
1999-2000	123.10
2000-2001	121.05
2001-2002	121.91
2002-2003	113.13*

* Advance Estimates / Source : Ministry of Agriculture
The effort, therefore, has to be concentrated in the rural sector and on the agricultural activities. Recourse to organic agriculture can be one way as we will discuss below:

Organic agriculture revolves around the farm with the objective that all the inputs should be generated from within the farm. This means that the production of bio-fertiliser, bio-insecticides/ pesticides will require to be done in the farm with the active participation of the farmers. To make an in depth analysis, we can list out the activities required to be done for farming activities:
1) Preparation of land,
2) Preparation of compost,
3) Seed selection and preparation,
4) Sowing/Plantation,
5) Weeding,
6) Fertiliser application,
7) Irrigation,
8) Harvesting, cleaning, grading, stacking & packing.

SEVA has been propagating the principles and practices of organic agriculture amongst the farmers in its project areas in the districts of North 24 Parganas and Birbhum. A study was made to determine :

1) How much employment can be generated by taking recourse to organic means of production and chemical means.
2) Comparative yield under organic and chemical means.
3) Comparative cost of production by adopting both the means of agriculture.

Material and Methods

Basic Condition:
a) Unit land area has been taken as the local measure of 1 bigha, which is equivalent to 0.33 acre or 0.132 hectare.
b) Three types of land have been analyzed – high, medium and low.
c) Crop rotation: Two sets of crop rotations plan have been tried – paddy – mustard – paddy and brinjal – coriander leaf – patol (parbal). The second combination has been attempted, since farmers in North 24 Parganas are very much conversant in producing vegetables, particularly the leafy ones.
d) Since organic seed is not available, we had to choose normally available seeds for both the methods of cultivation.
e) Organic agriculture practice pre-supposed participation of in-farm personnel in the productive process. This has been quantified and valued as per the market rate of external labour.
f) The results of the study are given in the enclosure. These show that depending on the crop type, the yield varies under organic and chemical means.
g) The cost of production is generally low in case of organic practice.

h) The manpower needed has been calculated as man-days and as per local practice, if one man-day consists of six working hours.
i) It would be observed from the detailed table that on an average there is a scope for increased use of manpower to the extent of 60% from that, which is needed for chemical fertilizer.

Our study is basically an indicative one. At this stage we can only hope that similar organization in their places will also make such studies and arrive at their own conclusion.

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Rural Development Possibilities Through Smallholder Organizations

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Abstract : In any organic project there should be three components - social, ecological and economical components and these components should be well balanced. The social component is not well prominent in individual farm production system but is an essential component in a smallholder group of production. This social component extends to the whole community over a process of time during the production program. In case of our organic cotton production through smallholder groups, the projects is located in highly ecologically restrained areas which are arid and semi arid areas and the lands belong to the most socially and economically underprivileged sections of the community. Organic cotton projects in these areas have contributed to a great deal to the rural development and social empowerment of the farmers and the community as a whole.

The paper will discuss in detail the social dimensions involved in the case of the development of organic cotton project in Surendranagar district of Gujarat state in India Which was initiated in 1998. The project area consists of a heterogeneous community belonging to various castes and religion. The project has brought about communal harmony even though the state is ridden with a lot of communal strife and tensions. The project was able to bring in peaceful and harmonious relationships between communities in the project area. The process of the functioning of the organic cotton project has various inbuilt conflict resolution mechanisms which have resulted in constructive and harmonious relationships between different communities in the project area.

The project has effectively incorporated the gender issues in the organic cotton production and has enabled women to be active partners in production, processing and marketing of the organic products in the project. The children in the farm households have also been given a proper orientation towards ecological responsibilities by taking up various activities along with the household members in organic production. The conventional cotton production involved intensive use of harmful pesticides. With the introduction of the production of organic cotton, the farmers have a greater occupational safety in the production of cotton. The project has altered and at times brought out new social structures to trickle down benefits which are provided to the community by the Government and also develop mechanism for sharing of profits which has been accrued through the marketing of organic products of the project. The project has built in various mechanisms through which a complete transparency in all operations was possible. This has developed a greater level of confidence and trust between the members of the group and the project managers. It has been observed that there has been a gradual and continuous increase in farm incomes primarily due to cost reduction and by the profits shared through the sale of organic products. Over a period of time the farmers involved in the project who were dependant on money lenders, local financial institutions and inputs suppliers have now become independent and self reliant in developing their own local resources both in terms of capital and inputs

required for organic farming. Over the past five years since the project has started this project has made a considerable social impact in 47 villages in Surendranagar district which is conceived as a great social achievement and has earned a good recognition both from the community and from the Government agencies.

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Key words: social dimensions, communal harmony, general issues, role of children's, social structures, profit sharing, transparency, self reliance, etc.

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Social, Legal and Economic Aspects of Organic Agriculture in Bangladesh - Krisoks

Perspectives and Experiences

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Abstract : Apparently the mission was nearly impossible.
To inspire a Krisok Samaj(Farming Community) to be kept ourselves on the dreamy track for establishing a Research Institute, to enjoy the ocean of pain and drops of joy, to motivate ourselves towards Organic Philosophy, to build some tinny boats with our own efforts and available resources – instead of boaring on big ships, to not to be greedy for glittering “Project Culture” and life style were really an impossible mission.

Not even those, in the areana of “chemical business” in a country like Bangladesh-where still there is no initiative for “Organic Agricultural Policy” and rarely the voice of Notun Krisok (Organic Farmer)is heard…there working for Rural Development through Organic Philosophy is a risky business.

Although a Notun Krisok sees the biotic and abiotic communities aroundher/him as a single life, and the life is dealt with great care and respect to the wholeness. The actions to life is generated automatically, as (s)he has the clear perception about the interactions among lives and the wisdom of experiential science. But much more consciousness was(is) needed about the changing pattern of environment, policies, technological commodities and social behavior.

The right of the Krisok Samaj to live in a sound environment in each step are inherently linked with the natural rights of environment. In the process of life and livelihood, they continuously have to develop their own paradigm.
While palying with a new concept it was needed to discover easier ways of perceiving and implementing legal aspects of environment in the local community – which values socio-cultural norms by understanding and utilizing social network and local legal advocacy system.

However, the nature of the society is constantly changing. In this course of continuous change, every phenomenon had to be studied in its particular concrete existence at a particular space, time, demand and from the correct scientific angle.

We krisoks are deeply convinced that social, environmental and economic parameters are interdependent, indivisible and mutually reinforcing components of a local community. Thus fulfilling peoples cultural, material and spiritual needs are socially desirable in organic philosophy.

The paper is a part of the endless self-story of a Krisok samaj on the way of forming the philosophical - ethical guideline and driving mechanism (social, legal and economic) of the Research Institute. That is showing a notun seedling of hope for a Notun Jibon(New life)

Status of use of Organics in Crop Production in Himachal Pradesh - North Western Hill State of India

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Palampur – 176062 (H.P.) – INDIA

Introduction

Chemicalization of agriculture has resulted in the deterioration of soil health, thereby culminating environmental pollution and stagnation in the productivity. Also the use of agricultural chemicals has significant effect on food chain and micro-organisms of the soil. Further, depletion of non-renewable sources of energy and escalating price of fertilizers are the issues of concern with respect to agricultural productivity. The aforesaid points have necessitated for the altlernative focussing on the use of available renewable sources of plant nutrition for sustainable agricultural production. So, looking at various options, the solution available is to actively promote the use of organics through organic farming or integrated farming system. Although organic farming system favours maximum use of organics including biopesticides, yet mention has to be made regarding integrated farming system which reduce the use of chemicals by integrating organics. To be sustainable, a given land must produce adequate yields of high quality, be profitable, protect the environment, conserve the resources and be socially responsible in the long term (Banett and Odum, 2000).

Himachal Pradesh, the north-western hill state of India has a deep dissected topography with mosaic of mountain ranges and valleys of varying slopes and different altitudes. The soils are shallow to deep in depth. The climate ranges from sub-tropical through sub-temperate and temperate to sub-arctic cold desert type. The range of topography, climate and soil provides the state with variation in biodiversity also. The economy of the state is primarily agrarian and provides sustence to about 69 per cent of the total population. Under the four agro-climatic zones, the major cereal crops are maize, wheat, rice and potato, peas, cole crops, ginger and tomato are the main vegetable crops. Tea, an industrial crop is also being grown in parts of this state.

The concern about the adverse effects on soil health as well as productivity related to imbalanced and inadequate use of fertilizers in this state is also of paramount importance. The present fertilizer use (N+P2O5+K2O) per hectare is about 41 kg only as against the all India average of 91 kg. The other factor is the imbalanced use of nutrients as revealed by the present ratio of 5.7:1.3:1 (N:P2O5:K2O) in H.P. against the national average of 6.6:2.5:1 (Fertilizer Marketing News, 2002). So there is need to establish the opinion to support the addition of organics to crops to narrow down this vitiated ratio of nutrient consumption, a step for balanced nutrition.

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Further, state of Himachal Pradesh has wide potential to use organics as revelaed by the potential of nutrients available from renewable sources of energy as livestock excreta and crop residues. The provisional figures (Sharma and Sharma, 2000) indicate that the availability of N, P2O5 and K2O from livestock extreta is about 34972, 82196 and 17601 tonnes/year (Table 1). The corresponding values for crop residues are 11098, 5683 and 16423 tonnes/year (Table 2). In addition to this, there is sufficient availability of plant biomass as Lantana camara, Eupatorium sp, Albizzia leaves and other waste weeds (Table 3). Also, there is availability of microbial bio-resources as Rhizobium, Mycorrhizae and phosphate solublizing bacteria in different agro-climatic zones of the state.

Table1: Nutrient content and theoretical potential of total dung excretion by cattle, buffaloes, sheep, goat and poultry birds (Dry weight basis).

Source	Annual dung excreta Million tones/year	Nutrient in tones/year		
		N	P_2O_5	K_2O
Cattle	3.92	15680	62720	7840
Buffaloes	1.20	16800	18000	9600
Sheep & Goat	0.39	2340	1950	117
Poultry	0.02	152	126	44
Total	5.53	34972	82796	17601

* Research report of survey on livestock market of Himachal Pradesh, Department of Agricultural Economics, HPKV, Palampur. 1997.
* Advanced Animal Nutrition for developing countries. V.B.Singh, IVRI, Izatnagar.
* Practical Manual, Department of Livestock Production and Management, HAU, Hisar.

Table 2: Nutrient content and theoretical potential of crop residues (Dry weightBasis/year).

Crop	Grain straw ratio	Straw production 000 tonnes	Nutrient content (tonnes)		
			N	P_2O_5	K_2O
Rice	1:1.5	181	1049	416	3004
Wheat	1:1.5	946	4635	2365	1210
Maize	1:1.5	930	5394	2883	12183
Pulses	1:1.1	13	20	19	26
Total		2070	11098	5683	16423

Source: 1.Fertilizer Statistics, FAI, New Delhi, 1997-98.
2. Fertilizers Organic Manures, Recyclable wastes and Biofertilizers by H.L.S.Tandon, 1992. FDCO, 204-204A Bhanot Corner, 1-2, Parmposh Enclave, New Delhi.

Table 3: Nutrient content of waste biomass (DM).

Sr.No.	Organics	% nutrients			C:N ratio
		N	P	K	
1.	Albizzia litter	3.81	0.14	0.58	11.46
2.	Tea skiffings	4.38	0.15	0.57	12.08
3.	Lantana clippings	2.5	0.25	1.14	23.2
4.	Eupatorium clippings	2.3	0.22	1.02	20.0

Albizzia litter and tea skiffings constitute the available mass to the tune of 1400-25000 kg/ha/year.

The paper describes the research efforts having been made through field, pot and laboratory experiments on the use of organics in improving the soil environment and enhancing the crop productivity.

The paper is being presented under the following sub-heads:

1. Use of organics in relation to improvement of soil physical environment.
2. Recycling of crop residues and waste plant biomass as nutrient source.
3. Effect of organics (farm yard manure and compost) on P use efficiency and crop productivity.
4. Role of organics on crop production under different cropping systems.
5. Effect of green manuring and bio-fertilizers on soil health and crop productivity.
6. Conclusions.

RESEARCH ON ORGANIC FARMING

1. USE OF ORGANICS IN RELATION TO IMPROVEMENT OF SOIL PHYSICAL ENVIRONMENT

Effect of mulching on the previous standing maize (Acharya and Kapur, 1993) with an organic waste-wild sage (Lantana camara) at receding monsoon for moisture conservation and carry over effect for wheat was studied during 1987-90 at HPKV experimental farm, Palampur to mitigate the problem of non availability of pre-sowing irrigation to wheat. This practice not only ensured timely sowing of wheat and maximum water use efficiency of rainfed crop, but also increased the crop yield equivalent to 40 kg N.

The results of data in Table 4 reveal the long term effect of fertilizer use and farm yard manure on dominant soil physical properties in experiments conducted in an acid Alfisol in maize-wheat cropping sequence. The results depict the values after 15 years of continuous cropping. It may be observed that treatment receiving FYM+100 per cent NPK Recommended improved the structural index as revealed by reduction in bulk density and increase in mean weight diameter. The cummulative infiltration also increased with farm yard manure incorporation. The treatment outyielded the other inorganic fertilizer treatments in terms of maize and wheat grain yied.

Table 4: Long term effect of fertilizer use and farm yard manure on some Physical properties.

Treatment	Bulk density (g/cm^3)		Mean weight diameter(mm)		Cummulative infiltration(cm)
	at 0-7.5cm	at 7.5-15 cm	at 0-7.5 cm	at 7.5-15 cm	
50% NPK	1.18	1.27	3.07	3.31	19.8
100% NPK	1.19	1.21	3.04	2.58	35.9
100% NPK+ FYM	1.03	1.23	3.93	3.80	50.9

Acharya et al. (1988).

In another study (Sharma et al. 1995) studied soil structural improvements with the addition of Lantana camara biomass in rice-wheat cropping sequence in a silty clay loam soil by incorporating lantana @ 10, 20 and 30 t/ha (fresh weight) 10-15 days; before puddling. At the end of 6th cropping season; results obtained by lantana additions are given in table 5.

Table 5: Effect of annual applications of *Lantana camara* on bulk density of Soil, aggregates and water stable aggregates in a silty clay loam soil.

Lantana Application (t/ha)	Bulk density (t/m^3)		Aggregates (2-8 mm)	Water stable aggregates >0.25 mm(%)
	0-7.5 cm	7.5-15 cm		
0	1.42	1.14	1.54	72.9
10	1.39	1.48	1.50	79.0
20	1.34	1.46	1.49	81.9
30	1.31	1.38	1.48	82.8
LSD(P=0.05)	0.05	0.07	0.04	3.3

(Sharma et al.1995).

The studies showed increase in aggregate stability and decrease in soil bulk density due to lantana addition, which could probably be the result of build up in organic matter. These are the important parameters related to structural improvement and finally the crop yields. Similar findings have also been reported by Bhagat and Verma (1991) and Bhagat et al. (1994) in improving the physical properties of clay soils in North West Himalayas.

Later studies of Acharya et al. (1998) have revealed that application of wild sage @ 10 t/ha to previous maize standing crop helped in conserving the soil moisture for rainfed wheat, thereby enhancing the wheat productivity in a silty clay loam soil.

2. RECYCLING OF CROP AND WASTE RESIDUES AND BIOMASS AS NUTRIENT SOURCE

To study the long term effects of rice straw management practices in wheat-rice rotation, experiments were started from the dry season (Nov.-May) of 1984 – wet season (July-Nov.) of

1989 at HPKV farm, Palampur. Each year six straw management practices, vis-à-vis control, straw incorporation (S1), straw mulch (SM), straw burning (SB), animal manure incorporation (AM) and straw and animal manure incorporation (S1+AM) were imposed to wheat crop and their subsequent residual effect was studied on following rice crop under three levels of N. The rate of straw and animal manure was 5 t/ha on dry weight basis. After 5 years experimentation, the maximum soil build up of organic carbon; available N, P and K was observed under S1+AM, followed by AM and SM, it was minimum under SB and control. These treatments also improved the physical environment of soil by decreasing bulk density and increasing percentage of water stable aggregates. Considering the production levels of wheat and rice, S1+AM treatment resulted in saving of 60 kg N/ha each for wheat and rice (Verma and Bhagat, 1992).

Table 6: Effect of crop wastes on the fertilizer use efficiency of applied Nitrogen in wheat.

Treatment	Recovery fraction of N(%) Mean of 2 years (1984-86)	N use efficiency (kg grain kg^{-1} N) Mean of 2 years (1984-86)
120 kg N/ha	67.2	25.9
Sugarcane trash+ 120 kg N/ha	85.8	31.8
Mustard straw+ 120 kg N/ha	75.6	29.4

Dev and Bhardwaj (1991).

Dev and Bhardwaj (1991) studied the effect of sugarcane trash and mustard straw incorporation on the N use efficiency in wheat-maize system in an acid clay loam Alsifol. Three levels of N: @ 0, 60 and 120 kg N ha-1 were studied in combination with 5 t ha-1 of the crop residues. The results are given in Table 6.

Nitrogen recovery and N use efficiency estimated at the 120 kg level of the applied nitrogen were found to have been substantially influenced by the incorporation of crop residues. Increased N use efficiency had significant and positive effect on crop yield and N uptake. Earlier Verma et al. (1988) have also reported that incorporation of Eupatorium in soil @ 5 t/ha had a significant effect on growth and yield of wheat in combination with N upto 60 kg/ha in an acid soil.

3. EFFECT OF ORGANICS (FYM, COMPOST) ON N AND P USE EFFICIENCY AND CROP PRODUCTIVITY

The research results having been published in the past (Sharma and Gupta, 1987) elucidate the usefulness of organics with inorganics in wheat productivity in the acid soils of Himahal Pradesh where P is deficient. A reference to the data in table 7 indicate that the P levels, ranging from 30-180 kg P2O5 ha-1 (averaged over FYM) improved the productivity of wheat from 49-142 per cent yet the role of organics FYM in enhancing the productivity further has been found to the tune of 35%.

Table 7: Effect of phosphorus and organic manures in improving the Productivity of wheat (S-308) in an acid Alfisol Soil.

Effect of P levels (P_2O_5 kg ha^{-1})	Grain productivity (kg ha^{-1})	Per cent increase
0	1718	--
30	2558	49
60	2943	71
90	3511	104
120	3802	121
150	4433	142
180	4160	132
LSD (0.05)	330	--
Effect of FYM		
No farm yard manure	2769	--
Farm yard manure @ 8 t ha^{-1}	3729	35
LSD (0.05)	199	--

Source: Sharma, P.K. 1997.

In an another attempt on the use of organics with inorganics in wheat in the soils of mid west Himalayas (Sharma, P.K. 1985-86 unpublished data); it was found that about 33% saving in inorganics (N, P and K) could be effected if organics such as 10 t ha-1 FYM or 5 t ha-1 poultry manure could be incorporated with 67% of recommended NPK. Similar findings have also been reported in Potato crop. It was concluded that a saving of inorganics to the tune of 25% could be possible if one uses 75% of the recommended inorganics with 20 t ha-1 of farm yard manure.

Further, the long term effect of continuous addition of farm manure and chemical fertilizer have also been studied in maize-wheat sequence in mid hill soils of Himachal Pradesh. After 23 years of experimentation; soil samples were collected and analysed for various chemical and microbiological properties and later, their reflections were reported on crop yields. The details are given in Table 8.

Table 8: Long term effect of fertilizers and farm yard manure on chemical, microbiological properties and total productivity in a mid hill acid Soil (1972-73 to 1994-95).

Chemical properties								
Treatments	pH	OC(%)	Primary Nutrients (kg ha^{-1})			Micro nrtients (mg kg^{-1})	Secondary Nutrients [C mole P^+ kg^{-1}]	
			N	P	K	Zn	Ca	Mg
100% NPK	5.26	0.98	348	150	167	0.6	2.5	0.6
100% NPK+ FYM@ 10t/ha	5.19	1.29	405	187	151	1.7	3.3	1.2
Initial status	5.80	0.79	736	12	194	1.9	5.3	1.3
Microbioligical properties								

Treatments	Microbial Biomass(mg C kg^{-1})	No. of microorganisms CFU($10^6 g^{-1}$ Soil)	
		Bacteria	Fungi
100% NPK	316	34	5
100% NPK+ FYM@ 10t/ha	410	71	62
Total productivity(Maize + Wheat)			
100% NPK	55-65 q ha^{-1}		
100% NPK+ FYM@ 10t/ha	70-85 q ha^{-1}		

The reference to Table 8 reveals that there was 60% increase in organic carbon content of soil in FYM imposed treatment compared to the initial level. Similarly this treatment recorded higher values of N than NPK alone. Unlike N, there was a substantial build up of available P with its continuous addition and again the built-up was higher in NPK+FYM treatment. Available K values declined from the original values. Secondary nutrients such as Ca and Mg were higher in FYM treatment. As regards the microbial biomass and microbial population, higher values were recorded in FYM + 100% NPK treatment. Total productivity of maize and wheat in 100% NPK + FYM treatment was quite higher than NPK alone. The state average productivity of maize and wheat is about 34 q/ha. So there is vast potential to increase average productivity under farmers' conditions .

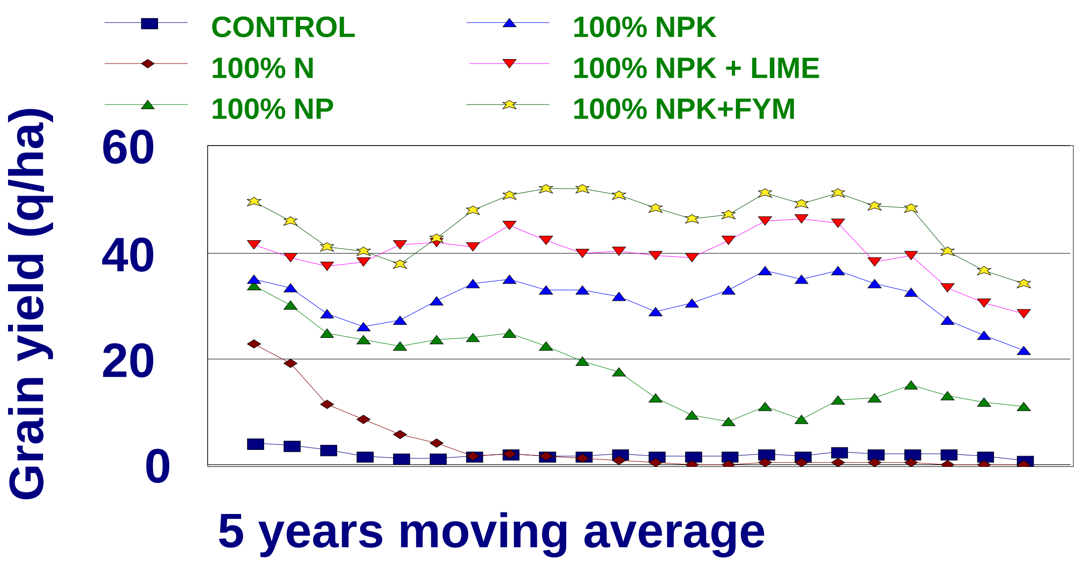

Fig. 1. Effect of balanced fertilization and organic manuring on total grain yeil(Maize+Wheat) based on five years moving average(1972-73 to 1999-2000).

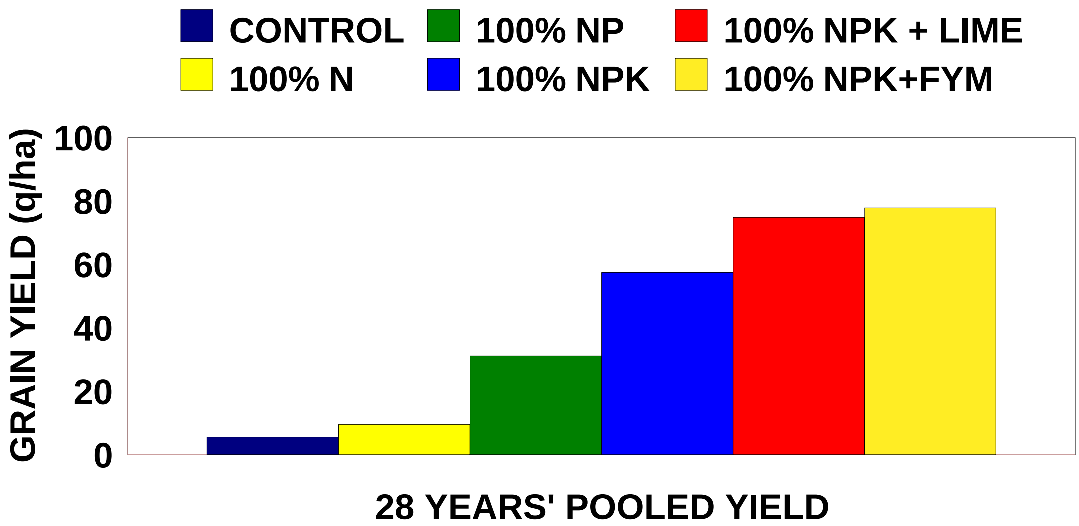

Fig.2: Effect of balanced fertilization and organic manuring on total grain yield (Maize+Wheat) pooled for 28 years (1972-73 to 199-2000).

Verma (1991) attempted to study the methods of farm yard manure application in maize under rainfed conditions. The results reveal that among different methods tried, mixing of FYM with upper 15 cm soil before sowing outyield the other methods.

Organics have also been reported to increase the efficiency of P use through insoluble rock phosphate P source in different type of soils. Sharma and Bhardwaj (1993) have reported that agronomic effectiveness of indigenous rock phosphates vis-à-vis Udaipur rock phosphate and Mussourie rock phosphate could be increased by application of farm yard manure @ 10 t ha-1 in conjunction with 60 kg P2O5 applied through rock phosphate in soybean crop. In another study by Sharma et al. (1995), organics as farm yard manure and biogas slurry were evaluated for their effect on the productivity of wheat and maize in an acid soil and the results are depicted in Table 9.

Table 9: Effect of Udaipur rock phosphate alone and in combination with organics on the yield of wheat and maize (q/ha).

Treatment	Direct effect (wheat) Grain yield	Residual effect (Maize) Grain yield
Control	17.0	21.3
90 kg P_2O_5 as URP	19.0	35.3
90 kg P_2O_5/ha as URP+ 20 t FYM/ha	27.7	34.7
90 kgP_2O_5/ha as URP + 20 t BGS/ha	28.3	34.5
CD (P=0.05)	4.7	NS

URP – Udaipur rock phosphate; BGS – Biogas slurry.

As indicated by figures, wheat yield increased significantly when rock phosphate was applied in combination with organics @ 20 t/ha. Comparing the agronomic effectiveness of organics, both FYM and BGS were at par in affecting the crop productivity.

The results of field studies on productivity and quality of French beans as affected by integrated phosphorus management (Jasrotia and Sharma, 1991) in an acid soil have revealed that application of FYM @ 20 t ha-1 alongwith 80 kg P2O5 ha-1 could result in substantial increase in green pod yield and also saving 18 kg P2O5 application through chemical fertilizer alone. Farm yard manure application improved the quality of fresh French bean pods in terms of crude protein content and per cent total soluble solids.

In acid soils, P deficiency is one of the major constraints which adversely affect the production of different crops. The present fertilizer nutrient consumption ratio (N:P2O5:K2O) is 5.7:1.3:1, is a vitiated one from the normal ratio of 4:2:1. This shows the minimum use of phosphatic fertilizers in the state. Also, the escalated price of water soluble phosphatic material such as SSP being high, P fertilizer use becomes costly. Under such conditions, the use of indigenous P sources such as rock phosphate can be exploited. At the same time, the indigenous rock phosphates namely Udaipur rock phosphate, Mussourie rock phosphate and Prulia rock phosphate etc. are insoluble and low grade phosphate sources. To increase the efficiency of such rock phosphates, there has been the use of mineral acids – a cost effective technology. However, the use of organics is another possibility, by which the effectiveness of rock phosphates can be increased. For this, compost and farm yard manure enrichment with P through rock P; an economically viable technology, has been developed in India and the research component of the same generated for soils of Himachal state; is given here under.

Sharma and Sharma (1997) studied the direct and residual effects of compost enriched with Mussourie rock phosphate (MRP) in wheat-rice sequence. Compost rich in P and N was prepared by composting MRP with fresh cow dung and green lantana biomass for 90 days in different treatment combinations. Composting increased the water soluble P, total P and total N contents and lowered the C:N ratio. The compost applied @ 5 t/ha on dry weight basis was comparable with single super phosphate (39.3 kg P/ha + 5 tonnes FYM on dry weight basis) in terms of crop yield, nutrient uptake and nutrient status of the soil. Further studies of Thakur and Sharma (1998) have elucidated the role of Azotobacter inoculation on the transformation of N and P during composting while using rock phosphate for preparing P enriched compost. With the addition of rock phosphate @ 12.5 and 25.0 per cent, quality organic fertilizer rich in N and P can be prepared by composting it for a period of 90 days with fresh cow dung during inoculation with Aspergillus awamori and Azotobacter chroococcum at the start and 30 days of composting, respectively. Sharma and Bhardwaj (2000) demonstrated the effect of P enriched farm yard manure on the productivity of maize and wheat crops following experiments on research farm and farmers' fields. Phosphocomposting after due decomposition period achieves its enhanced quality as revealed by the data in Table 10 and consequently affect the crop productivity – table 11 (Sharma and Bhardwaj, 2000).

Direct and residual effect of P enriched manurial products on maize and wheat productivity was studied at the research farm of HPKV and the results are given in Table 11.

Table 10: Phosphorus enriched manurial products and quality after 90 days of Decomposition.

Product	OC%	Total nutrients (%) N	P	K	C/N ratio	C/P ratio
FYM as such	30.7	1.63	0.58	0.86	18.8	52.9
0.22% P enriched FYM	31.0	1.68	1.00	0.86	18.4	36.0
0.44% P enriched FYM	29.5	1.62	1.20	0.83	18.2	24.5
0.66% P enriched FYM	30.5	1.79	1.44	0.74	17.0	21.1
FYM + Eupatorium	31.2	1.70	0.85	0.89	18.3	36.7
0.22% P enriched (FYM + Eupatorium)	32.4	1.88	1.06	0.90	17.2	30.5
0.44% P enriched (FYM + Eupatorium)	30.2	1.86	1.22	0.92	16.2	24.7
0.66% P enriched (FYM + Eupatorium)	31.1	1.93	1.46	0.89	1.61	21.3
Original values						
Fresh FYM	39.0	1.41	0.43	0.72	28.0	91.0
Eupatorium sp.	45.3	2.32	0.22	1.02	19.5	20.5

Direct and residual effect of P enriched manorial products on maize and wheat productivity was studied at the research farm of HPKV and the results are given in table.

Table 11: Direct and residual effect of P-enriched manurial products on maize and wheat productivity (Grain yield q/ha).

Treatment	Direct effect maize grain yield Kharif 1997	Kharif 1998	Residual effect wheat grain yield Rabi 1997-98	Rabi 1997-98
T1 FYM as such	33.2	29.4	29.3	20.3
T2 0.22% enriched FYM	37.1	36.8	32.3	23.0
T3 0.44% enriched FYM	48.0	45.3	37.3	24.3
T4 0.66% enriched FYM	48.1	47.8	39.3	26.0
T5 FYM + Eupatorium	34.2	32.8	33.7	21.3
T6 0.22% enriched (FYM + Eupatorium)	40.1	37.3	36.0	23.3
T7 0.22% enriched (FYM + Eupatorium)	47.3	45.8	39.3	24.0
T8 0.22% enriched (FYM + Eupatorium)	49.5	47.1	41.7	26.6
T9 Reco. N, K and P (50:50 Mixture of Rock-P:SSP)	39.5	38.4	32.7	21.0
T10 Reco. N,K and P (Rock-P)	34.7	33.0	34.7	22.6
T11 Reco. N,K and P (SSP)	42.2	44.1	31.7	20.3
T12 Reco. N and K only	31.6	27.2	26.3	16.0
LSD (5%)	5.0	2.7	2.7	2.2

1. FYM and FYM + Eupa. Biomass applied @ 10 t/ha.
2. In treatment T2 to T8 nitrogen was applied @ 25% of the reco. Dose.
3. In treatments T1-T8 no K was applied.
4. For residual crop what, only reco. N and K were applied.

The perusal of data infer that 0.44% P enrichment level of FYM and FYM + Eupatorium biomass products had an edge over the standard treatment (T11) with respect to maize grain yield. Significant residual effects of treatments were recorded in terms of wheat grain yield. The data (given in Table 12) reveal that maximum wheat grain yield of 28.2 q/ha was obtained with the chemical fertilizer treatment (T2). This was followed by the yield of the treatment where P enriched FYM @ 10 t/ha was applied alongwith N @ 25% of the recommended dose and without any application of potassium fertilizer. The application of P enriched manurial products, thus, saved 100 per cent K fertilizer and 75 per cent of N fertilizer.

Table 12: Effect of manurial treatments on wheat grain yield in a silty clay loam acid soil.

Treatments		Wheat grain yield (q/ha)
T1	Farmers' practice; FYM @ 10 t/ha + N @25% of the recommended	21.9
T2	N, P and K recommended	28.2
T3	0.44% P enriched FYM @ 10 t/ha and N @ 25%	26.1
T4	N, K only (recommended)	19.6

In treatments T1 and T3, no potassium was applied.

Source: Technical Report of ICAR adhoc project "Utilization of indigenous rock phosphate enriched farm yard manure as 'P' source in acid soils of Himachal Pradesh", Department of Soil Science, HPKV, Palampur, 2000

4. Effect of organics on crop production under different cropping systems

The results pertaining to long term effects of different organics vis-à-vis FYM, crop residue (wheat straw) and green manuring in paddy-wheat sequence are given in Table 13. Organics were applied to the paddy crop and their residual effect was observed on the succeeding wheat crop. By and large the treatment 50% NPK + 50% FYM recorded significant increase in paddy grains yield over the treatment (T5), where 100% NPK were applied through chemical fetilisers. The experimental data infer that by applying 50% of FYM dose to rice we can save 50 per cent of the recommended NPK dose. These findings also coroborrate the results obtained under on farm trials at the farmers' fields where 100% NPK treatment produced average paddy grain yield of 25.0 q and the treatment 50% NPK + 50% FYM produced the average yield of 29.0 q/ha. The succeeding wheat crop exhibited the similar trend with respect to the residual effect of organics as FYM on grain yield.

The results pertaining to yield maximization experiments conducted in a silty clay loam soil, acidic in reaction (pH 5.4) are given in Table 14. Maize yield data with respect to100 per cent recommended NPK treatment and use of FYM @ 20 t/ha signifies that over 5 years, use of FYM had an edge over the 100% NPK treatment. It may also be recalled that there was no yield stagnation. Maximising the yield by increasing NPK dose to 150 per cent, also could not compete with 20 t FYM dose in affecting the maize grain yield. The succeeding wheat crop grain yield data also signifies that application of FYM can produce substantial yield levels comparable to even 150 per cent NPK recommended dose treatment during 5 years of the cropping season.

Table 13: Long term supplementary effect of organics on crop productivity in paddy-wheat system.

Treatments		Paddy grain yield (kg/ha)								
		1993	1994	1995	1996	1997	1998	1999	2000	2001
T1	Control	2640	2285	2814	1873	1577	2238	2272	659	2814
T2	50% NPK	3200	2957	3127	2625	2133	2596	2608	995	3136
T3	50% NPK	3150	3038	3047	2585	1801	2553	2630	1174	2867
T4	75% NPK	3360	3011	3239	2693	2258	2598	3002	1299	3244
T5	100% NPK	3350	3262	3138	3029	2016	2639	3221	1169	3271
T6	50% NPK + 50% FYM	3910	3432	3871	3208	2536	3058	3835	1532	3539
T7	75% NPK + 25% FYM	3340	3208	3244	2840	2034	2631	2773	1304	3181
T8	50% NPK + 50% wheat straw	3380	2939	3235	2616	2294	2637	2598	1263	3217
T9	75% NPK + 25% wheat straw	3180	3315	3378	2822	2536	2708	2392	1178	3351
T10	50% NPK + 50% GM	3420	3181	3759	2787	2213	2739	3181	1281	2858
T11	75% NPK + 25% GM	3610	2975	3728	3002	2616	2828	3038	1039	3324
T12	Farmers' practice	3120	3396	3593	3208	2357	2906	3038	1434	3647
	CD (5%)	341	356	107	386	345	NS	501	191	NS

		Wheat grain yield (kg/ha)								
		1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000 2001	2001-2002
T1	Control	1170	705	860	1460	632	883	1711	1460	1039
T2	50% NPK	2420	2043	1604	3324	1308	2742	2527	2446	2554
T3	100% NPK	2830	2666	1165	4444	1640	3024	3683	2661	2930
T4	75% NPK	2390	2393	1810	3831	1492	3190	3042	2527	2840
T5	100% NPK	3300	3275	2478	4382	2160	3356	3607	3181	4194
T6	100% NPK	3470	3177	2549	4247	2177	3356	4211	3602	4489
T7	75% NPK	2550	2445	2097	3145	1864	2567	3414	3091	3217
T8	100% NPK	2910	2621	1465	3947	2285	2522	3226	2769	3835
T9	75% NPK	2770	2540	1900	3387	1604	1828	2598	2294	2545
T10	100% NPK	2690	2948	1322	4453	2070	3033	3432	2912	3002
T11	75% NPK	2830	2227	1808	3566	1855	3015	3253	2688	2840
T12	Farmers' practice	2600	1953	1586	3369	1304	2370	2966	2464	2760
	CD (5%)	388	538	192	796	654	950	769	300	603

Source: Annual Reports (1991-2001) of the ICAR project on "Cropping System Research", Department of Agronomy, CSKHPKV, Palampur (H.P.)

Table 14: Effect of fertilizers and FYM levels on grain yield of maize and wheat (kg/ha).

Treatments	**1992-93**		**1993-94**		**1994-95**		**1995-96**		**1996-97**	
	Maize	Wheat	Maize	Wheat	Maize	Wheat	Maize	Wheat	Maize	Wheat
Plant populations										
Recommended	4993	4391	8390	4890	7406	3785	5392	6466	7907	5877
150% of Rec.	4899	4627	8010	4910	7701	3532	5189	6547	8025	6073
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fertilizer levels										
100% NPK	4355	3797	7160	4390	6641	3371	4866	5709	7370	5322
150% NPK	5004	4637	8220	5230	7425	3802	5185	6745	8070	6174
200% NPK	5477	5093	9220	5070	8714	3804	5821	7068	8457	6428
CD at 5%	582	604	1109	631	1053	NS	695	1029	NS	687
FYM levels										
No manure	4328	4102	7420	4570	6523	3440	3691	5981	6467	5082
20 t FYM/ha	5563	4916	8980	5230	8664	3878	6890	7031	9465	6868
CD at 5%	524	276	979	253	779	NS	467	329	547	318

Source: Annual Report (1992-97) of the ICAR Project on "Cropping System Research", Department of Agronomy, CSKHPKV, Palampur.

5. EFFECT OF GREEN MANURING AND BIOFERTILIZERS ON SOIL HEALTH AND CROP PRODUCTIVITY

Green manuring and bio fertilizer, a critical component of organic farming is discussed hereunder to elucidate their effect on soil health and productivity. The efficiency of Sesbania cannabina as a green manure for rice was studied (Bhardwaj and Dev, 1985) by considering the production and decomposition of legume in three soils including silty clay loam soil of Palam Valley in Himachal Pradesh after 45, 55 and 65 days of growth. The green manure, raised as catch crop in wheat-rice rotation, added, on an average 18, 28 and 37 t ha-1 of green matter and 98, 147 and 165 kg N ha-1 at the three growth stages, respectively. The grain yield of rice transplanted immediately after turning under the green manure was equivalent to 100-120 kg N ha-1 of chemical N. The studies of Bhardwaj et al. (1991), further substantiate the role of green manuring in saving the chemical fertilizer use. Their study reveals that incorporation of 10 t of wild sage, on hectare basis, significantly increased the wheat yield and saved 30 kg N/ha in an acidic silty clay loam soil.

In other study Sharma et al. (2000), have reported that green manuring of sannhemp (Crotolaria juncia) in combination with 40 kg N/ha applied to rice exhibited significant manurial effect by giving rice yield equivalent to application of 120 kg N. Further, response of irrigated rice to the blue green algae in the presence and absence of nitrogen has been recorded in sandy loam soils of Himachal Pradesh. Suri et al. (1995) have recorded that treatments of BGA @ 10 kg ha-1 + N @ 90 kg ha-1, BGA + N @ 60 kg ha-1 and N @ 90 kg –1 gave statistically similar rice grain yield, indicating the saving of 30 kg chemical N due to use of BGA. Earlier field studies of Suri and Puri (1994), have also exhibited a saving of about 25 kg N/ha with the application of BGA (Anabaena sp.) alongwith N applied through chemical source in wet land rice.

The preliminary studies (Vivek, 2001) on the effect of vermicompost on wheat productivity have been given in Table 15. The studies have revealed the significant effect of organics on the wheat grain yield. Lantana vermicompost recorded significantly higher wheat grain yield of 26.6 q/ha over the farm yard manure treatment. It may also be recalled that Lantana compost yielded at par with 100% NPK through chemical fertilizers.

The results of table 16 reveal that inoculation of indigenous strains of rhizobium has significant effect on the green pod yield of French bean. The results further infer that at lower dose of N application, the treatment N20R1 recorded substantial increase in green pod yield of French bean in comparison to non inoculated treatment N20R0.

Table 15: Effect of organics and fertilizers on wheat productivity in a sandy loam soil

Treatment	Grain yield (q/ha) Rabi 1999-2000
Control	22.9
*FYM	25.1
*Lantana vermicompost	26.9
*Congress grass vermicompost	25.9
CD (P=0.05)	1.4
Per cent of Rec. NPK dose	
33	24.9
67	27.2
100	27.6
CD(P=0.05)	1.4

* Applied @ 10 t/ha.

Source: Vivek Sharma, 2001. Production of vermicompost and its evaluation in wheat. M.Sc. Thesis. Submitted to and accepted by CSKHPKV, Palampur.

Table 16: Effect of Inoculation (Indigenous strains) on the green pod yield of French bean.

Treatments	Green pod yield (q/ha)
N0R0	30.5
N0R1	36.6
N20R0	33.0
N20R1	39.2
N40R0	34.6
N40R1	35.1
N60R0	36.2
N60R1	37.2
CD(P=0.05)	2.9

R0 – No inoculation; R1 – Inoculation.

Source: ICAR adhoc project report (2001) on "Studies on Rhizobium culture Inoculation in French bean (*Phaseolus vulgaris*) under different Hydrothermal regimes in H.P.".

6. CONCLUSIONS

In Himachal Pradesh the inherent soil related constraints responsible for low productivity, mostly emanate from soil fertility disorders in addition to poor physical environment and soil erodibility. There is great concern about the adverse effect on soil health as well as productivity related to the imbalanced and inadequate use of fertilizers in Himachal Pradesh. The present fertilizer use (N+P2O5+K2O) per hectare is about 41 kg only as against national average of 91 kg.

Further, the vitiated ratio of nutrient use (5:1.3:1) for N:P2O5:K2O is another factor revealing the imbalanced use of nutrients as against the normal ratio of 4:2:1 for cereal based crop sequence. To narrow down this ratio, opinion has to be created to support the additional organics alongwith chemical fertilizers i.e. integrated nutrient supply. This state has wide potential to use organics as revealed by the potential of nutrients available from the livestock excreta and crop residues. The provisional figures indicated that the availability of N, P2O5 and K2O from the livestock excreta is about 34972, 82796 and 17601 tonnes/year. The corresponding figures for crop residues are 11098, 5683 and 16423 tonnes/year. In addition to this, there is sufficient availability of weedy biomass as Lantana camara and Eupatorium etc. which can be composted for incorporation in soils. In order to maintain use of organic sustainable agricultural production, at the present pace of population pressure, the use of organics have to be integrated with chemical fertilizers.

Apart from this, the use of organics in the form of mulch materials and soil incorporations have elucidated the improvement in soil physical environment due to improvement of structural parameters, such as bulk density, aggregate stability and mean weight diameter of soil particles. The application of wild sage (Lantana camara) @ 10 t ha-1 to previous standing maize crop helped to conserve soil moisture for rainfed wheat, thereby, improving wheat productivity.

Recycling of crop residues as sugarcane trash and mustard straw @ 5 t/ha in a silty clay loam soil increased the N recovery and N use efficiency of applied nitrogen in wheat-maize crop sequence. Similarly, the beneficial effect of biomass of Eupatorium incorporation have also been found in affecting growth and productivity of wheat while integrating it with 60 kg N/ha through chemical fertilizers.

In another study, it was found that about 33% saving in inorganic (N+P+K fertilizers) could be effected if organics such as 10 t FYM or 5 t poultry manure were applied with chemical fertilizer.

Long term fertilizer experiments for over 23 years have also revealed the positive effect of organics in terms of nutrient build up and increase in microbial population. The study has further indicated higher maize+wheat productivity in the treatment comprising of NPK+FYM in comparison to the NPK treatment.

Field studies on the supplementing use of farm yard manure in rice-wheat sequence have revealed that by applying 50% NPK through chemical fertilizers alongwith 50% through farm yard manure, we can save 50% use of chemical fertilizers as indicated by the rice grain yield.

Organics have been found to increase the efficiency of P, the most deficient element in acid soils. Application of FYM @ 10 t/ha in conjunction with 60 kg P2O5/ha through insoluble and cheap source of P (Rock phosphate) has substantially increased the productivity of soybean crop. Application of P enriched FYM through rock phosphate @ 10 t/ha increased the wheat yield, comparable to water soluble source as SSP. This saved 100 per cent potash and 75 per cent of chemical N fertilizer to the direct crop.
The grain yield of rice transplanted immediately after turning the green manure was equivalent to 100-120 kg N/ha of chemical N. In another study, it was found that green manuring with Sunhemp in combination with 40 kg N/ha applied to rice exhibit significant manurial effect by giving rice yield equivalent to the application of 120 kg N.

The use of blue green algae (BGA) in wet land rice has saved about 30 kg of chemical N as revealed by the field experiments in rice growing soils.

Lantana vermicompost applied @ 10 t/ha had produced wheat grain yield at par with 100% NPK treatment in a sandy loam soil.

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The Role of Organic Farming in Addressing the Issue of “the Rural Development in China" and Some Suggestions

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Abstract: Development of organic farming produces significant ecological, environmental and social benefits and hence enjoys wide promising future in the countryside of China. Moreover, the it accords in direction with the policy of the government addressing the Issue of" the Rural areas, the agriculture and farmers" and plays an important role in promoting solution to problems in these aspects in the new epoch of the country.
Key words: The organic farming, rural, the farmer and agricultural" problems, suggestion

1. Conception of organic farming

Organic farming refers to a kind of sustainable agricultural production processes that observe the principle of ecology, the natural law, and the principle of dynamic interactions between the soil, plant, animal, microbe, mankind, eco-system and environment, harmonize crop cultivation with animal rearing in balance, prohibit the use of any GMOs and products thereof, or any synthetic chemical pesticide, fertilizer, growth regulator, feed additive, etc., and advocate adoption of a series of sustainable-development-oriented agricultural techniques. Production of organic food is only one of the major targets of organic farming.

2. The Concept and connotation of the issue of "the Rural areas, Agriculture and Farmers"

The Issue of "the Rural areas, the Agriculture and Farmers" refers to those parts of rural areas and farmers that stick to the traditional living habits and agricultural cultivation. This issue is and will remain to be one of utmost importance in a long period of time in future. In January 2003, in its work meeting addressing issues of rural areas, the central government stated: To address the issue of "Rural areas, the Agriculture and Farmers" should be taken as the priority one among the important jobs, especially with the farmers, who income should be improved." The issue also represents itself in irrational agricultural production structure, deterioration of the rural eco-environment and the need of the rural population for improvement of quality, etc.

3. Positive role of development of organic farming in settling the issue

1) The over a dozen years of history of the development of organic farming has demonstrated its function of harmonizing the economic, social and ecological benefit and its positive role in realizing agricultural sustainable development. Analysis shows that the development of organic farming can significantly promote settlement of the Issue at least in the following aspects:

The Contribute to remediation of the rural eco- environment, the thus creating a sound environment for production of organic agricultural produce with higher additional value and increasing the farmers' income

Quality agricultural production and eco-environment protection are two components of an entity that are contradicting each other, but depending on each other, interacting each other and sharing a common fate. The 21st century is one of quality. Food quality and safety will direct affect the life quality and health of the people. A mature rational consumer will not only care about test results of the food, but also set forth more and more strict requirements for the management of processing of the food. The In the present day when the consumers have greatly improved their environment awareness," the Green consumption" has become the dominant tide in the world consumption. In the situation of economic globalization and trade liberalization, organic food, being a product higher in additional value and safety and friendly to ecology, possesses a high competitive power. The With China entering the WTO and the economic globalization being sped up, the international trade barriers like quota system, the licensing system, and tariff, are vanishing, whereas non-customs barriers – green technical barrier, are gaining momentum. The problem with residues of pesticides, nitrate, the nitrite and heavy metals in products often harasses the country's exportation of agricultural produce as a direct result of the abuse of highly toxic efficient pesticides and chemical fertilizers and over- standard discharge of industrial wastes. Moreover, the price of the agricultural produce from China is more and more subject to the impact of changes in the world economy and strong competition from the agricultural produce of other countries. Consequently, the exportation of agricultural produce, which has long been one of the major hard currency earners, is confronted with stern challenges. Some export-oriented produce are balked or rejected, for which one of the reasons is that the production fails to overcome the “technical barrier”. In other words, the production or processing of some agricultural products does not comply with the international standard. To improve quality of agricultural produce is one of the objectives of developing organic farming. Hence, some experts stated: “Mastery of the techniques and standards for management and production of organic food is equal to acquisition of a pass to the international market for agricultural produce.” The experience after China became member of the WTO also demonstrates that with the development of economic globalization, the focus of competition for agricultural produce is no longer price, but quality. Hence, the government has put forth a new agricultural concept integrating “quality, yield, efficiency, ecology and safety”. In April 2001, the State Environment Protection Administration promulgated a “Technical criteria for organic food”, which is the technical standard for production and processing of organic food in line with the world’s requirements. The Criteria stresses that organic farming systems must follow the natural law and the principle of ecology and reject the use of any chemical fertilizer and pesticide. Thus production bases in compliance with the international technical requirements for organic food production can thus be established to produce organic food that can break through the technical customs barrier, and the problem of energy crisis resulting from the consumption of large volumes of un-renewable energy resources, like petrol and coal, for production of synthetic agricultural input essential in conventional agriculture can be effectively solved. Development of organic farming also facilitates solution of such a series of problems resulting from abuse of chemical fertilizers and pesticides as contamination of food, deterioration of quality, decline in biodiversity and disturbance of ecological balance, etc. The eco-environment and biodiversity in some of the organic food production bases in China are now found effectively maintained or significantly improved.

The agriculture of China has developed and turned from the old simple resource-oriented to the present multi-demand oriented one. In the past, when resources of agricultural produce were inadequate, increase in yield would just mean increase in profit. But now, with the development of the economy and society, changes have taken place in the demand-and-supply relationship with some agricultural products. As a result, these products could not find enough market or be sold at a reasonable price. In this case, increase in yield does not necessary mean increase in profit. Organic food features high additional value, strong competitive power and worldwide acceptance. So the transition from conventional farming to organic farming may help solve the problem of yield-increase-does-not-increase-profit in agriculture. According to the Jiangsu Academy of Social Sciences, having accomplished conversion from conventional farming to organic farming, 9 production bases out of 11 have increased their sales revenue by 36%.

Currently, the sales of organic food account only for less than 1% of that of food in total in the world. It is anticipated that the 21st century will see the sales of organic food going up to 6 – 10%. So, the organic food industry can expectedly become one of the fastest growing industries in the 10 years to come. Restrained by lack of labor resources, developed countries will have to rely on importation for organic food. In the past 6 years, the sales of organic food increased at a rate of 25 – 30% in EU, US and Japan. The sales value of organic food in Japan is expected to reach 100 billion US dollars, accounting for 6 – 10% of that of the food in total. Each year Germany, the Netherlands and UK import large quantities of organic food, making up 60%, 60% and 70% of the total organic food consumed, respectively. Obviously, organic food has become a major product developing countries can export to developed countries. Since the 1990s, organic farming has been developing drastically in China, and the output and scale of organic food production and the variety of organic products expanding steadily. Now in the organic market over 100 varieties of organic food are available. With the rising living standard and awareness of food safety and health care of the people, the consumption of organic food in China also shows a rapidly increasing trend. Particularly in cities, like Shanghai, Beijing, Guangzhou, Nanjing, Qingdao, etc. organic food has found stalls in large-scaled supermarket. Nevertheless, in China the sales of organic food account only for no more than 0.1% of that of food in total, far below the world's average of 2%, from which it can be inferred that the organic food production in China is far from enough to meeting the domestic and world markets in either quantity or variety.

According to statistics available, the yield of organic farming is generally 20 – 30% lower than that of conventional one, but the cost of input for soil building and disease, pest and weed control 40% lower (if the "covert cost" in the form of the impact of the modern agricultural production may cause on the environment and food quality is also counted, the cost of organic farming would be much lower.). Moreover, the sales price of organic food is usually 30 – 50% higher than that of common food of the same variety (up to 150% in Europe). The high additional value can not only offset the loss from yield decrease, but also gain from the widened gap between the lower capital input and higher product price. The international standard for organic farming also requires fewer middlemen in distribution and stresses the principle of fair trade, so a big part of the profit gained from development of organic food may go back into the hand of the farmers.

2) Beneficial to readjustment of the industrial structure of the agriculture and solution to the problem of village labor force employment

Currently, China is carrying out strategic readjustment of the structure of its agriculture and rural economy, to make it automatically adapt to the demand of the world and domestic markets for diversity and high quality of agricultural produce, so as to improve the holistic quality and benefit of the agriculture from the stump. However, the agricultural restructuring progresses rather slowly. The traditional pattern of mono-grain cropping remains to a key problem with the Issue of "the Rural regions, the Agriculture and the Farmers". It is, therefore, essential to gradually lead the broad masses of farmers to face the market and bring into full play the comparative benefit. The output of vegetable and fruit in China accounts for 70% and 14%, respectively, of the world's, but their export only for 10% and 3%, respectively. The output of meet makes up one-quarter but its export only 3%. Most of the output becomes unmarketable, just because it could not find a suitable market. Then why would so many farmers stick to the traditional farming pattern rather than readjust their plantation structure by growing more cash crops? The key problem is the "small-holder consciousness" in the mind of the farmers: "Gain? Yes, Loss? No!" Obviously, the farmers feel quite contradictory, longing for restructuring of the agricultural industry on one hand and being afraid to bear risks on the other. Organic food is agricultural products produced and processed in line with the general standard of IFOAM and specific requirements of individual country or region and hence is strongly market-oriented. In China some areas that have succeeded in developing organic farming often adopt the organization form of "company + farmer households" or "company + base" and the development and management model of "contract agriculture", which efficiently integrates production, processing, storage and distribution of organic products. On the premise of being in compliance with the standard for organic certification, the organic operator, with a market-oriented flexible and adjustable agricultural cultivation structure, practices business-like operation, thus avoiding overstock of agricultural products due to unmarketable quality or lack of market. Currently in developing organic farming, this is a successful and major management model. In this development and management model, the company and the farmers or bases form an economic community sharing both interest and risks. Thus the farmers can not only be assured of basic incomes, but also get some profit. The development of organic farming can successfully clear up the contradictory feeling in the heart of the farmers and materialize the objective of restructuring agricultural economy. In China there is another organic farming development and management model, i.e. a leading company gets lands from farmers by lease and form an organic farm. The company bears all the possible risks and the farmers become paid farm workers under signed labor contracts. Thus the company can more flexibly adjust the agricultural cultivation structure in light of changes in supply and demand of the market, and organic deep processing of the agricultural produce as well, which in turn further facilitate adjustment of agricultural production structure and protect farmers' enthusiasm in organic production.

Moreover, in most rural regions of China, vast population and limited land resources lead to surplus of labors. In organic farming, it is stipulated that no synthetic chemicals can be used for soil building and disease, pest and weed control in management of the production, as a result, the input of human labor is much higher than that in conventional farming. Development of organic farming can thus to an extent dull the sharp problem of labor surplus, common in the rural areas of China. Besides, in field management in organic farming, a number of farming activities are not labor consuming, but call for carefulness and patience, thus facilitating women and the aged taking part in the production system and raising their social economic positions.

3) Facilitating development of organic farming and farmers' learning of advanced agricultural production and processing knowledge

In comparison with organic farming, traditional farming is an extensive mono-cropping one, which is usually small in size and does not involve much sci-tech knowledge, whereas organic farming needs much sci-tech knowledge, must meet a set technical standard in soil building and disease, pest and weed control and at the same tine is required to ensure traceability of its products throughout the entire management processes from the dinner table to the soil. It is, therefore, important for organic farming operators to master certain agricultural knowledge as well as possess the ability to manage the farming operation. Consequently, the farmers have opportunities to study or get trained in new knowledge for organic farming management during the operation of organic production. The basic standard of IFOAM and the standards of organic certifying agencies for organic certification not only stress that the operation must be managed in compliance with the standards, but also require that operators and growers get trained in organic farming knowledge. For instance, the Japanese Agricultural Standard (JAS) will make organic certification decisions by taking into account as a decisive factor whether the chief managerial personnel of an organic operation have received JAS training in technical standard within a set time frame.

Since the 1980s, the Nanjing Institute of Environmental Science of SEPA, China Agricultural University, Nanjing Agricultural University and some enterprises that have succeeded in development of organic farming have one after another established organic farming research institutions, which have play an active role in giving publicity to and popularizing organic farming knowledge, not only helping farmers to master advanced agricultural production knowledge, but also improving their own quality. It is discovered through investigations that the farmers in organic farming bases obviously know more agricultural knowledge. Their mastery of new knowledge will be a sound foundation for transformation of agricultural science and technology into productivity.

4. Conclusion

Every coin has two sides. In China, productivity exists in several layers and so does the consumption potential, the vast countryside is not only a limiting factor in development, but also a place where hopes and potential advantages that will promote development lurk. The development of organic farming is more and more closely related to environment protection, economic activities and human life. It can be expected that organic farming will be a solution to a series of rural problems, such as low income of the farmers, pollution of rural eco-environment and steady development of rural economy, and problems of food safety and social justice as well. The organic farming production in China will keep on expanding in scale and getting enriched in theory and practical technique. After China became member of WTO, its agriculture is confronted with both opportunities and challenges. With the development of the economic globalization, the interaction between economy and environment will certain drive forwards the organic agriculture in China. Consequently, China will have to meet with the challenges that the world trade liberalization and economic globalization may bring about. It is, therefore, essential for China to grasp the opportunity, and energetically develop organic farming so as to steadily improve the income of farmers, promote harmonized development of the economy, ecology and society, and push the agriculture toward industrialization, standardization and internationalization in a sustainable, steady and healthy way.

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Organic Farming : A Holistic Approach For Safe Food and Sustainable Agriculture

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SITUATION

Nature is a gift of God. We should follow the laws of nature to have socially, culturally, economically and healthy life as health is wealth. But , in race of meeting the demands of increasing population in the world there is over exploitation of natural resources and spoiling them by polluting inputs. We should always remember that

If No safe inputs.
No safe soil, air, water and food.
No safe life and future generations.

The food, water and air are contaminated by excessive use of poisonous inputs like chemical fertilizers and pesticides. Majority of food is coming from agriculture and allied fields. So the maximum emphasis should be laid on input and production system in agriculture.
If we look to the situation of use of agrochemicals in agriculture and their residues in different food matter, it is very dangerous.

Residues in various food products

Sr.No.	Detail	Per cent of Sample
1	DDT in vegetables	100 %
2	BHC in vegetables	90 %
3	DDT in branded wheat flour	23 %
4	Ethion in branded wheat flour	72 %
5	Lindane in branded wheat flour	100 %
5	Pesticide residues in dairy products	72 %
6	Pesticide residues in cereals and pulses	50-60 %

Source: Different surveys

At this junction, this process of disturbing natural balance in eco system should be prevented; otherwise it will be very late to come back to nature and safe life. This can be achieved by organic farming approach.

ORGANIC FARMING APPROACH

Organic faming is one of the most important step of sustainable agriculture based upon a set of processes that leads to safe & nutritive food, social justice, animal welfare, & ultimately balance ecosystem. It is an ecological management system that promotes and enhances biodiversity, biological cycles & soil biological activities. It minimizes the use of man-made external inputs especially, chemicals, synthetic materials & pesticides to produce uncontaminated food of high nutritional quality & in sufficient quantity.

The agricultural inputs, fertilizers and pesticides are causing pollution of soil, ground water and contamination of food commodities. The nitrogenous and phosphatic fertilizers result in deterioration of water quality from accelerated eutrophication. Eutrophication of water surface leads to problem with its use for fisheries, recreation, industry or drinking due to increase in growth of undesirable algae and adequate weeds. Soil pollution with heavy metals particularly cadmium (cd) from phosphetic fertilizers on rice.
All these have direct effect on human health leading to diseases like neuritis, proteinurea, osteomalacea and cancer. Nitrous oxide derived from fertilizers is also responsible for ozone layer depletion and ultimately global warning. Excessive use of pesticides not only adversely affect the soil biological processes but also led to decline in the biodiversity.
Therefore, to prevent this poisonous cycle, the emphasis should be laid on three main components.
A. Use of organic fertilizers:
B. Plant protection measures:
C. Conservation of resources and maintaining biodiversity

A. Use of organic fertilizers:

Organic fertilizers provide nutrients including micronutrients. They are more effective for improving soil physical condition. If, the soil physical condition is proper then the soil temperature, soil aeration, water holding capacity, microbial activities would be very favorable for crop growth and production for long period. While chemical fertilizers are effective for short run and inducing the polluting substances in the soil, water and air as well as they create the problems of soil physical condition. So, organic fertilizers should be used instead of chemical fertilizers. The organic fertilizers may be : Farm Yard Manure, vermi-compost, biogas slurry, sheep and goat manure, cakes, biofertilizers, green manuring etc.
The research findings shows that the organic fertilizers are beneficial on long run.

Organic Farming : A Holistic Approach For Safe Food and Sustainable Agriculture

SITUATION

APPLICATION OF HAZARDOUS INPUTS
EXPLOITATION OF NATURAL RESOURCES
IMBALANCE OF ECO SYSTEM
No safe soil, air, water and food.
No safe life and future generations.

⇩

ORGANIC FARMING APPROACH

- USE OF ORGANIC FERTILIZERS
- PREVENTIVE MEASURES USE OF BIO PESTICIDES MECHANICAL, CULTURAL METHODS
- CONSERVATION OF RESOURCES AND MAINTAINING BIODIVERSITY

⇩

STRATEGIES

WHAT IS NEEDED		HOW
1. ACUTE NEED OF CREATING DEMAND OF ORGANIC FOOD AMONG PEOPLE	⇨	1. BY MAKING CONSUMERS AWARE ABOUT THE VALUE OF PURE AND SAFE FOOD
2. ORGANIZING ORGANIC PRODUCT MARKETING FOR REMUNERATIVE PRICES	⇨	2. BRINGING TOGETHER THE ORGANIC PRODUCERS, TRADERS WITH FORMATION OF SOCIETIES AND ORGANIZATIONS AS WELL CONTRACT FARMING SYSTEM
3.PROVIDING EFFECTIVE ORGANIC FARMING PRACTICES TO FARMERS	⇨	3. REGULAR RESEARCH SUPPORT AND CONCENTRATED EXTENSION SYSTEM
4.MAINTAINING BIODIVERSITY	⇨	4. WATERSHED AND MIXED FARMING

⇩

SAFE FOOD AND SUSTAINABLE AGRICULTURE

(1) Effect of Farm Yard Manure on pod yield of groundnut

Groundnut is important oil seed crop consumed in form of more than hundreds of direct preparations from seed and oil and is also used as preservative and filler in pickles etc. So it is very important to be free from hazardous residues.
The pooled results of 17 years experiments conducted in India showed that significantly higher pod yield of groundnut was received under FYM application @ 25 t/ha.

Table 1. Pod yield of groundnut as influenced by various fertility treatments (Year 1999)

Sr. No.	Treatments	Groundnut (poole of 17 years)
1	Control	515
2	100 % N	512
3	50 % N	517
4	Direct effect of of FYM (25 t/ha)	947
5	First year residual effect of 25 t FYM/ha	670
6	Second year residual effect of 25 t FYM/ha	569
7	50 % NP	533
8	50 % NP + K @ 50 Kg K2O /ha	879
9	100 % NP	489
10	100 %NPK	875
11	NP (ST)	505
12	NP (ST) + K @50 kg K2O/ha	901

(2) Effect of six years continuous cropping of pearlmillet and application of FYM (10 t/ha) on fertility status of soil

It was observed that not only a beneficial effect of FYM application alone but also a synergistic effect of simultaneous application of FYM and inorganic fertilizers on crop yield. FYM also increased the N-use efficiency of urea and also improved the fertility status of soil .

Table 2. Effect of cropping of pearlmillet and application of FYM on fertility status of soil (Year 1995)

Sr. No.	Properties	Initial value (1983)	Level of FYM addition	
			0	10
1	Organic carbon %	0.27	0.25	0.33
2	Available P	6.31	5.68	8.00
3	Available N(kg/ha)	140.0	138.6	144.3
4	Available Mn (ppm)	5.54	5.60	5.86
5	Available Fe	2.00	2.09	2.18
6	Available Cu (ppm)	0.16	0.16	0.19

7	Available Zn (ppm)	0.31	0.37	0.45

(3) Effect of organic farming and chemical farming on yield of crops

The higher yield was obtained during first three years under chemical farming. but later the higher yield was obtained for two years under organic farming than chemical farming.

Table3. Effect of organic farming and chemical farming on yield of crops. (Q/ha) (Year 2002).

Sr. No.	Crops	Mean of 1996-98 (3 three years)		Mean of 1999-2000 (2 years)	
		Organic Farming	Chemical Farming	Organic Farming	Chemical Farming
Kharif Crops					
1	Maize	41.23	43.25	51.89	48.57
2	Maize	43.12	44.28	53.03	49.98
3	Mung/Soybean	5.48	5.85	14.80	14.50
4	Mung/Soybean	5.47	5.87	18.21	15.28
Rabi crops					
1	Wheat	40.65	49.00	52.75	52.30
2	Wheat	47.02	49.74	47.37	47.26
3	Gobhi sarson	10.96	13.08	14.59	13.26
4	Gobhi sarson	12.97	13.56	12.69	11.65

(4) Crop Response with BGA Application

The investigations conducted in multi-locations in India have indicated about 10 to 15 per cent increase in rice yields with blue-green algae application. Sustainability of BGA is observed more in dry season than in wet season and long duration rice varieties showed more positive response than to short duration ones. Comparison on N fertilizer and BGA inoculation indicates that BGA inoculation is equivalent to the application of 20-30 kg/ha. Besides N, these algae are also known to provide growth-promoting substances. They are also helping in reclamation of saline soils and improve soil texture by soil aggregation property.

Table 4. Effect of Blue Green Algae on Paddy Yield (Year 1999).

Sr. No.	Treatment	Grain yield in Q/ha		Per cent increase By BGA	
		Kharif	Rabi	Kharif	Rabi
1	Control	22.0	35.5	-	-
2	BGA	28.5	39.5	29.50	12.80
3	30 Kg N	27.5	38.5	-	-
4	30 kg N+ BGA	34.0	43.5	29.25	12.98
5	60 Kg N	35.5	42.0	-	-
6	60 KgN + BGA	38.0	46.0	7.04	9.52

B. Plant Protection Measures:

There are different methods of pest control such as physical, mechanical, agronomic, biological and chemical. However, farmers usually prefer to apply chemical method in order to avoid loss to crops. But the disadvantage of the chemical method is that, it creates environmental pollution, health hazards, kills the beneficial insects and is very costly system. So, farmers should use biological approach with some other methods instead of chemical measures to produce pure, safe and valued food.
The following methods should be given more emphasis.

1.Prevention is better than cure:
(1) This can be done by integration of making unfavorable environment to the pest and increasing the population of natural enemies of pest.
(2) The more concentration should be on development of disease-pest resistance varieties.
(3) The crops and varieties should be grown in their natural habitat so they can perform better.

2. Biological and indigenous methods
(1) Bajra flour (1kg) is mixed with 15 liters of water in air tight container and is kept inside manure pit for 20 days. After filtration 25 ml. of preparation with 15 liters of water controls any larval infestation.
(2) A solution prepared from Neem leaf paste in water (10 kg: 1 Liter)is effective to control leaf folder of rice.
(3) Urine of cow is sprinkled on fennel crop to minimize aphid infestation
(4) Extract of Ipomoea leaves in water (1:1) is used to control brown plant hopper in rice.
(5) Soaking of sorghum seeds in cow urine for 2 to 3 minutes and drying them immediately under the sun before sowing gives better protection against grain smut.
(6) Soaking of wheat seed in the milk before sowing to avoid rust disease.
(7) Dusting of mixture of 10 days old flour of Bajra and ash (1:4) on the cumin crop before flowering to avoid the infestation of powdery mildew.
(8) Leaves of Naffatia (Ipomoea fistulosa) are incorporated in the sorghum and rice grains for long time preservation.
(9) Pulses mixed with little cow dung powder in earthen pots can be stored for long time.
(10) Smearing of the seeds of wheat and many other crops with castor oil for long term preservation.
(11) Extensive and cooperative use of Light traps, pheromone traps, bio agents, friendly predators as well as parasites etc.

3. Mechanical methods
(1) Collection of leaves with egg masses and larvae

(2) Mulching
(3) Flooding e.g. banana wilt, bacterial blight of cotton

4. Cultural methods
These methods involves the practices which makes the environment less favorable for pests, eliminating their food and making more favorable situation for their natural enemies.
(1) Deep ploughing is very effective to control Cephalosporium stripe of wheat.
(2) Application of organic amendments significantly controls the root rot.
(3) Crop rotation is effective to control soil borne diseases. e.g. garlic, onion, beet root and lucern are suggested for controlling Fusarium wilt of melons and cucumber.
(4) Trap cropping, Inter cropping, Strip farming, etc.

C. Conservation of resources and maintaining biodiversity

The importance of biodiversity in sustainability has a great role in the following aspects:
1) Environment: It play a central role in environmental functions such as water regulation, soil protection etc.
2) Agriculture: Prevention of erosion, biotechnology regeneration, biological pest control , moisture retention etc.
3) Forestry: Genetic material, habitat for many species, forestry byproducts.
4) Fishing and Fish farming: Habitat of an enormous diversity of flora and fauna.
5) Water supply: Water remains clean and regular
6) Public health: Regulation of ecological processes
The crop production, income of farmers and productivity of resources should also be increased with sustainable agriculture. It can be possible by adoption of watershed technology, which provides the parts of whole cycle of ecological balance. Watershed management is a holistic approach to bring about development of integrated farming systems which aims at optimizing use of land, water and vegetation in an area, moderate floods, prevent soil erosion, to alleviate drought, improve water availability and increase fuel, fodder and agricultural production on sustainable basis. It includes crop and livestock production, optimum pattern of exploitation of land resources, dry land horticulture, fodder and economically viable plantations in an integrated manner, environmental issues, social and cultural concerns as well as infrastructure planning. Thus, whole cycle should be developed in which all the parts can be interrelated through the followings.
(a) Adoption of watershed in situ technology by the farmers on their own fields which includes adoption of recommended tillage operations, multiple cropping system, sub-soiling, organic farming practices including indigenous agricultural methods, recharging of wells and bores, farm pond, high yielding varieties, mixed farming including paddy cultivation, fish farming, honey bee keeping etc.

(b) Adoption of watershed participatory technological approach with the help of government while constructing small water harvesting structures to prevent erosion and conserve soil as well as water.

Research findings about watershed show that:

1. The farmers who had adopted the well and bore recharging by rain water during rainy season could grow long duration cops in the place of short duration crops, could grow two or three crops in a year instead of one crop, could save their crops by life saving irrigation during dry spell of rain and had increased one or two milky animals as they were able to grow the fodder during whole year.
2. The extent of adoption of watershed management technology was observed better among those farmers who have positive attitude, good knowledge of watershed management technology, higher involvement with information sources and better contact with extension agencies.
3. The practice wise adoption of watershed management technology was ascertained and it was observed that the significant number of respondents had adopted watershed management technologies namely, short duration varieties and crops, inter culturing, use of organic manures and weed management through hand weeding. The results also indicated that higher adoption was observed for simple and no cost or low cost technologies like recharging of well.
4. Water harvesting structures are economically viable environmentally sound and socially acceptable. The economic analysis of 15 watershed management programmes under taken in different regions showed that investments in these programme is a profitable proposition from both economic (B.C. ratio > 1.2) point of view.
5. The execution of Watershed Management Programme increased irrigation potential (40 to 130%) in situ moisture conservation and enhanced cropping intensity by 56 to 110% .
6. Increase in productivity and total production of crops showed that the increase in productivity ranged from 21.4 per cent (Pigeon pea) to 245.8 per cent (Wheat) in about 5 years. The increase in productivity in other pure crops like Mustard, Groundnut and Pearl Millet 239 per cent, 229 per cent and 200 per cent, respectively.

The watershed is holistic approach which can convert the desert into green belt with full ecological balance and the earth into heaven.

STRATEGIES:

1. The demand of the organic food should be created by making the consumers aware about the true value of pure and safe organic food. For that exhibitions of organic material and preparations should be organised intensively.

2. Organic producers and traders should be bring together so that there would be easy marketing and contract farming with remunerative price to the producers.
3. Farmers are not adopting the organic farming approach without research support. Therefore, more efforts should made to organize research programmes for location specific methods of organic farming. After proved useful, they should be communicated to the farmers with integrated communication system.
4. Biodiversity should be maintained by adopting watershed technology and mixed farming system on farmers' fields and on common government land using the participatory approach.

Organic Food Subscription Schemes in Emerging Organic Markets: TEI-KEI, CSA and Box-Schemes.

Hanns-Michael Haldy, MBA

Introduction

In emerging organic food markets, dedicated producers and loyal consumers seek to establish a mutual social and economic relationship of trust, in order to foster ecological production and consumption. The principle of organic food subscription schemes was the ideal means. It has manifested itself in different ways during the last 3 decades, according to geography, culture, economy and the development of techniques. The main principles are TEI-KEI, CSA and Box-Schemes. This paper aims to provide practitioners of Asian organic farming and of the organic food distribution industry an

(i) introduction into TEI-KEI, CSA and Box-Schemes
(ii) outline of stages of development of Box-Schemes
(iii) overview of issues of farm based Box-Schemes.

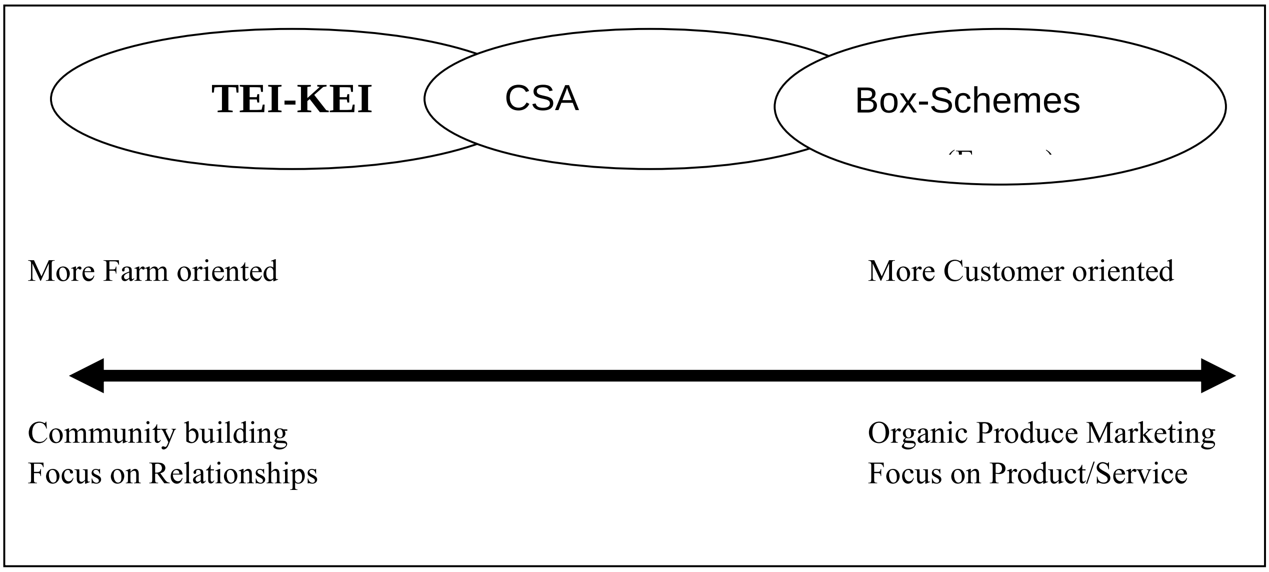
It is based on the author's research on organic food subscription schemes in four European countries in 2004 and subsequent research on TEI-KEI and CSA (HALDY 2004). It focuses on an economical and customer oriented analysis, whilst the ecological and sociological (incl. cultural) issues are merely named, not analysed.

The author is aware that this is a western approach which is seen as critical in the Asian Organic Movement. It reflects the author's cultural background and research. Therefore, the findings presented here aim to utilise an international and intercultural dialogue on the subject rather than to impose European findings in an Asian situation.

For a deeper understanding of the main issues of TEI-KEI, CSA and Box-Schemes, the cultural background has to be considered. CSA and Box-Schemes occur in (the) western culture, which is dominated by individualisation and personal benefits, whilst TEI-KEI stems from the Asian culture which is more group and relationship orientated. Furthermore, the three grass-root movements have evolved in Japan, the USA and Northern Europe respectively and thus reflect these national and subsequent regional cultures. Hence, the main system features, product features and service features and their relative importance to producers and consumers vary according to their socio-economical and socio-ecological context.

All three issues have developed in highly industrialised, free-market and democratic countries which in turn give way to generalisations according to customers living in these societies. They share in common the objective to overcome the shortfalls of industrial conventional agronomy by enhancing a trustful relationship between farmers and consumers. These three movements can be placed on a continuum scale according to their orientation from more farm or more customer orientated, as shown in exhibit 1:

Exhibit 1 “ Farm and Customer orientation of TEIKEI,CSA and Box-Schemes”



Source: This paper

The TEI-KEI System

PRETTY (2001) summarises :

“[TEI-KEI is]…an agreement between farmers and consumers. […] Members of a TEI-KEI group pay a weekly fee for a box of fresh produce accepting whatever quality and quantity delivered. They know the farmer personally, help with the farm and can influence the choice of crops grown”

The historical base of TEI-KEI has been the wide-spread food co-op system SEIKYO in Japan, which has already served 14m households in the 60s. Discontent with government policy was triggered by a food scandal in 1955. The TEI-KEI consumer-producer networks took off in the early 70s in Japan, as a grass-root response to pollution of food and general discontent in the state's agro-policies. In 1973, a core group of women, and motivated farmers of the Miyoshi Area to produce organic food for Tokyo villagers (MOEN 1997). According to FAO et al (2001) TEI-KEI was fostered by the Japan Organic Agriculture Association (JOAA), which formulated 10 basic principles in 1978, and by Nature Farming International Research Foundation (NFIRF). In the following years the TEI-KEI system supplied an unknown number of households with local and organic food through 500 to 1000 TEI-KEI Groups with 10 to 5000 members each, resulting in 1m to 1,8m members (JOAA 1993). The ITC et al (1999) cites experts believing that there are over one million TEI-KEI customers, responsible for 55% of all organic food sales (FAO et al 2001) in Japan.

The author doubts these estimations, as the produce sold through the TEI-KEI system were not certified organic in 1999, figures of members were reported to be in steep decline (HENDERSON 2002?) and the distinction of TEI-KEI and the traditional Co-Ops (SEIKYO) is not clear. Figures based on research conducted in Japan were not available in English, which itself indicates a less important role of the TEI-KEI for the organic market at present.

The foremost issue of the TEI-KEI system was to establish a rich and trustful producer-consumer relationship, which in turn enabled (or conserved) a sustainable decentralised rural community culture and aimed to change the consumer's behaviour towards ecology. (JOAA 2004).
Two trends can be identified:

Firstly, research by PRETTY (2001) indicates the difference in the organic produce delivery system from the direct consumer-producer contact towards larger organisations.
" Many TEI-KEI groups have grown or merged to form larger delivery schemes. These can be divided into food buying co-ops and commercial food distribution schemes with up to 21m members"

Secondly, HENDERSON (2002) describes an over aging and erosion of the customer base:
"…since 1971, the original 1000 members has dwindled to 100. The [TEI-KEI] group has divided into smaller groups and lost members who shop at supermarkets where cheaper organic food is available. Recruiting younger members is very difficult."

Furthermore she describes an increasing complexity of administration, which in turn indicates rising customer expectations of the weekly box product and service features.

In summary, information and figures on TEI-KEI is difficult to gain for non Japanese speaking researchers. TEI-KEI laid the foundation for organic farming and served as the main distribution system for organic produce in Japan for more than 3 decades. With the maturing of the organic food market, customers in Japan became more demanding as availability of organic produce increased. This resulted in a reduction of the dedicated loyal TEI-KEI members, whilst other customers switched to more convenient shopping alternatives like supermarkets and commercial subscription schemes. The TEI-KEI movement is uncertain about how to adopt a more customer (member) oriented approach without compromising too much with mainstream agro-industrial industry behaviour.

It is therefore of interest to analyse the younger American CSA movement, which was started in the mid-80s in the USA and has its roots in TEI-KEI.

The CSA Movement in the USA

The term Community Supported Agriculture (CSA) was coined in 1986 in the USA after the TEI-KEI impulse was tried in Switzerland and Germany (VAN EN 1995, GROH et al 1998).

CSA emphasises a more formal involvement of the members and addresses the more individual benefits for the customer/member than the TEI-KEI system which is often used as a marketing tool. On the other hand, CSA can be distinguished from organic food subscription schemes (OFSS) in Europe, by emphasising the community creating aspect, and not the commercial act of offering a sophisticated bundle of organic produce or service. Hence, the CSA farmer needs to provide the customer or CSA member with certain farm life encounters, and has to offer areas of member-participation.

According to DeMUTH (1993)

"CSA consists of a community of individuals who pledge support to a farm operation, so that the farmland becomes either legally or spiritually, the community's farm, with the growers and consumers providing mutual support and sharing risks and benefits of food production. Typically members or "share holders" of the farm pledge in advance to cover the anticipated costs of the farm operation and farmer's salary. In return, they receive shares in the farm's bounty throughout the growing season, as well as satisfaction gained from reconnecting to the land and participating directly in food production."

Nevertheless, as the CSA is a grass-root operation with no traditional cultural links like the TEI-KEI towards Japanese CO-Ops, it offers a wide range of local adaptations. According to BAUERMEISTER (1997) CSAs can be clustered into 4 distinctive groups: (i) Assuming the majority of the CSAs are farmer or subscription driven, where the CSA members concentrate on their weekly box (share) and have little influence on the farm. (ii) Shareholder or consumer driven CSA's are virtually managed by CSA members hiring a farmer to grow what they want. (iii) When farmers cooperate to supply a (subscription driven) CSA, they form a farmer cooperative. (iv) In cases where production resources are co-owned by farmers and consumers, CSA becomes a farmer-consumer cooperative.

Thus, the term CSA, in practice, summarises nearly all attempts in the USA to enhance direct and sustainable producer-consumer relationships in the organic food market. The main principle is to ensure that the organic farm can be economically sustained by financing its costs, for in turn the members receive the food.

In 1999 a quantitative research on CSA in the USA was conducted by LASS et al (2003). According to that research, 80% of the estimated 500-1000 CSA farms were concentrated in 16 northern regions. In 1999 there where about 6000 organic farmers, which indicates that 8% to 16% of the farms employ CSA. The typical CSA farm has 7,3 ha (18 acre) of which 2,8ha (7 acre) is cropland and has 29 full members (shares) and 23 half members (half shares) resulting in an annual turnover of 15.000 US$ (median). Furthermore, 35% of the CSA farms utilise 90% of their cropland for CSA use, whilst 44% of the farm use less than 30% of their arable land. Thus, CSA is only one means of generating income for these farms. According to these figures, the total CSAs of the US have a annual turnover (retail level prices) in 1999 of 9.5m US$, resulting in a market share of 1,2/1000, as the total US organic food sales were estimated at 7.7bn US$ (FAO/ITC/CTA 2001).

To summarise CSA are more farm-oriented than OFSS, and more consumer product/service oriented than the classic TEI-KEI movement. CSA as a means to provide a sustainable economic basis for the whole farm has to be questioned and seems only to be realised in a small number of cases. Furthermore, the relatively small number of members and the low percentage of arable land used for CSA indicate that CSA is not fully utilised by farmers and consumers to create a sustainable management of an organic farm - which was the main intention of the initial CSA promoters. We now investigate the OFSS of Europe.

Organic Food Subscription Schemes in Europe

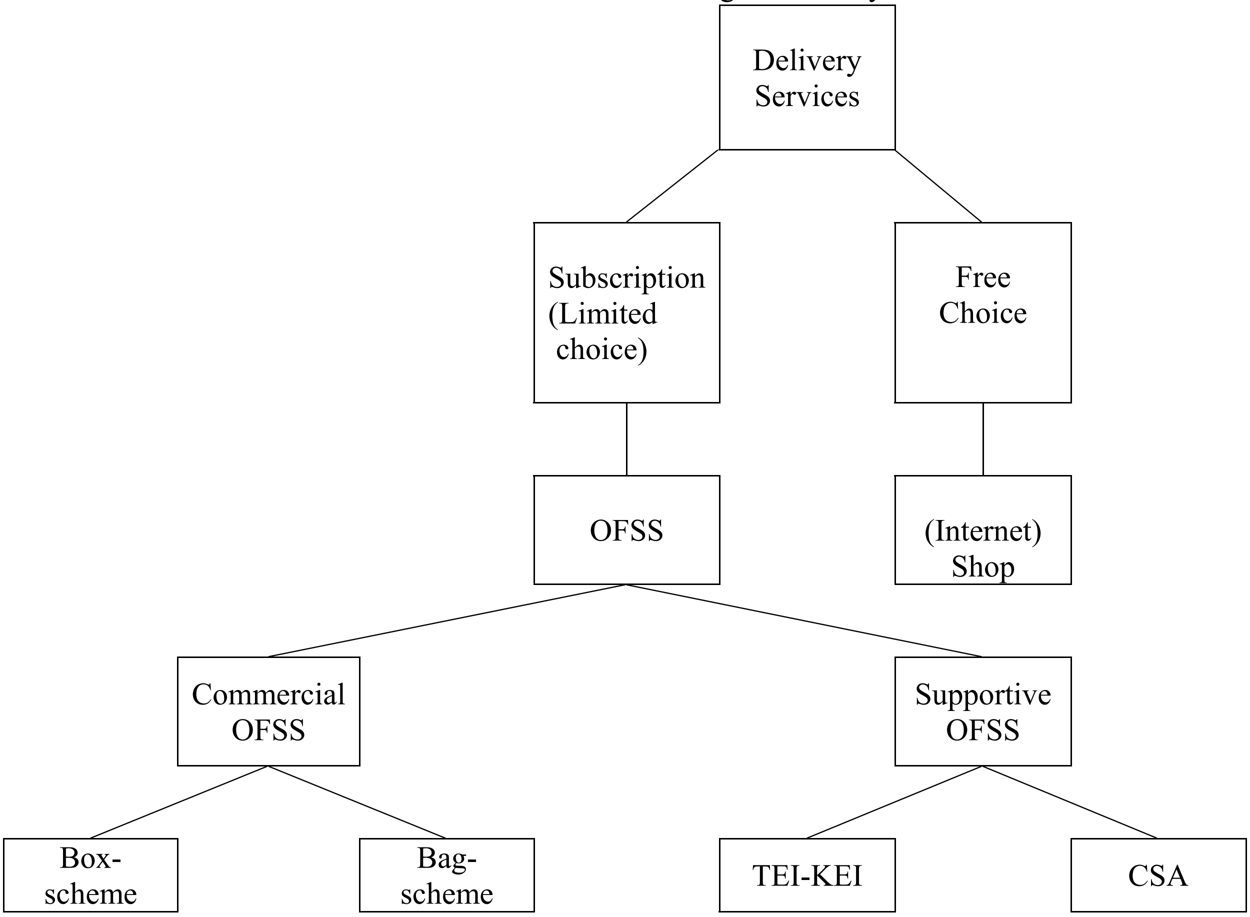
Even though the TEI-KEI impulse reached Europe in the 70s and was exported to the USA in the 80s where it became the CSA movement, it was not adopted. In northern Europe there was already a domestic culture of producer-consumer relationships. According to PRETTY (2001) there are various producer-consumer initiatives in Belgium, the Netherlands, Denmark and the three German speaking countries of Switzerland, Austria and Germany which have similarities to CSA, but are in general CO-OPs. Personal research indicated that these local initiatives differ in many ways. They are in general emphasising more than only the personal consumer benefit of availability of organic produce, as the availability of cheap and high quality organic produce has risen significantly in the last decade. Their aim is to perform social, economic and ecologic sustainable behaviour in daily life. These attempts are fuelled by socio-political motives, religious beliefs and bio-dynamic initiatives. Thus the driver is neither the farm or farming (CSA, TEI-KEI), nor the consumer benefit or produce/service (OFSS) but the urge towards a sustainable future. Organic farming, and especially bio-dynamic farming have mostly been the starting point which has evolved in spin-offs and more complex organisations. Consequently, some of these organisations tend to integrate many different businesses and services - not only organic food.

The most TEI-KEI and CSA related phenomena are the European Box- and Bag-schemes due to their distribution system, concentration on organic food and direct supply from farms. The latter have evolved from the beginning of the 90s in Germany and in the Netherlands (HALDY 2004).

Definition of Organic Food Subscription Schemes

Typically an OFSS is:
"A composition of dominantly fresh organic produce, designed and packed into a box or bag by a farm or trading company, subscribed to by the end-customer on a regular basis, and delivered to a place the consumer has agreed on."
From the customer's perspective, TEI-KEI, CSA and Box/Bag Schemes will be encountered as a delivery service with a limited choice of produce, frequency of shopping and quantity, as the boxes/bags will be designed by the farmer, delivered on a regular day with a fixed size. Furthermore, the pricing of the boxes/bags is either done on market prices of the individual organic produce within the box (commercial OFSS) or by paying a share of the farm's production costs (supportive OFSS). It is assumed that the pricing within the TEI-KEI and the CSA systems vary, i.e. some farms tend to price the produce/service, while others use the cost-share principle according to the emphasis of more farm or customer orientation (see exhibit 2 below).

Exhibit 2 " Definitions of OFSS according to Delivery Services"



Source: HALDY (2004)

Commercial OFSS can either be operated by a wholesaler (bag-scheme) or by a farm or retailer (Box-scheme).

A typical form of OFSS is an assortment of fresh organic vegetables and fruits, which is subscribed to on a weekly basis for a fixed price. It will be delivered in a box or bag to an agreed pick-up point (private or in shops) or directly to the consumer's home, as shown in picture 1.1. The commercial OFSS companies' box portfolio consist of various box types in different box sizes. Thus portfolio = types x sizes.

A common Box-Scheme portfolio consists of three sizes of vegetable boxes (S,M,L) two sizes of fruit (S,M), combinations of both, and additional boxes tailored to special customer groups (Breast-feeding mothers or elderly people). The prices of the three standard vegetable boxes are around 7 -14,50-24 US$. According to HALDY (2004), the price of the produce within the boxes in German and Danish boxes is higher, while in British and Dutch boxes it is about the same or even lower than in the supermarkets. The content of the box/bag is variable owing to season and owing to the number of customers who are allowed to influence it.

Some companies offer seasonal special boxes (e.g. Asparagus-Potatoes-Boxes, Salad-boxes) or full-meal boxes (e.g. Ratatouille-Boxes). Increasingly the companies offer the full range of fresh organic food produce like dairy (e.g. cheese and milk), meat & fish (frozen and fresh), bread, flowers and non-perishable food produce as well as cleaning products. This other produce can be ordered as an additional subscription, or as a subscription itself (e.g. cheese-box, bread-box).

OFSS in the different European Countries

Owing to size, the manner of operation, and tax regulations, the farm based OFSS has the legal standing of a retailing or wholesale company. Because the OFSS stem from regional initiatives, their set-up differs regionally and country wide. The four biggest OFSS companies in Europe are based in the UK, DK, and NL serving from 10.000 to 17.000 weekly customers/orders each. Germany has an estimated 300 companies of which about 145 use complex IT solutions for an estimated average of 400 to 2000 orders per week and per company. The importance for the organic food market is expressed in the following exhibit by the market share.

Exhibit 3 " OFSS – Estimations of Numbers of Companies and Market shares in 2003"

	Germany	**Denmark**	**The Netherlands**	**United Kingdom**
Number OFSS Companies	300	15	55	300
Orders per week in k orders	124	20	41	82
Turnover in m US$	444	13	20	50
National Turnover in bn US$	3,72	0,50	0,47	1,92
Market Share	8%-13%	2%-3%	3,5%-4,5%	2,5%-3%

Source: HALDY (2004)

The higher market share of OFSS in Germany in comparison to the other countries can be explained by the following reasons:
* the farmers are willing to sell not only their own produce but increasingly the whole range of organic fresh produce and storable organic foods
* OFSS software with PC-linked scales reduces waste and administers individualisation of boxes
* Box-Schemes are widely recognised in Germany, due to its longer time on the market
* Germany has a tradition of direct selling from farms (farm shops, farmer markets, Box-Schemes)
* Relatively low market share of supermarkets of 45%

In contrast to the small sized, and regional structure of the OFFS market within Germany, the other researched countries host one or two leading OFSS companies with market shares of 25-

80% of all orders as exhibit 4 shows. These leading OFSS companies stem from a local background, but tend to serve the whole country and conduct a retailer management style.

Exhibit 4 " Figures on the Structure of the OFSS Market"

	Germany	**Denmark**	**The Netherlands**	**The United Kingdom**
Number of companies	300	15	55	300
Industry Structure by customers (Companies with their weekly orders/customers)				
	200 comp. x 250 orders	10 comp. x 200 orders	30 comp. x 250 orders	273 comp. x 180 orders
	90 comp. x 600 orders	4 comp. x 600 orders	23 comp. x 600 orders	25 comp. x 500 orders
	10 comp. x 2000 orders	1 comp. x 16000 orders	2 comp. x 9000 orders	2 comp. x 10000 orders
orders weekly per country	124.000	20.400	41.000	81.500

Source: HALDY (2004) All figures are estimations.

In Denmark and the United Kingdom, the emergence of dominant companies is influenced by consumer discontent regarding supermarket policies. In both countries, supermarkets sell 75%-85% of all organic produce, and thus acting in practice as a monopoly. The supermarkets are not able or willing to offer an interesting variety of fresh organic produce countrywide, but are concentrating on 8 to 15 core products like onions, potatoes, carrots and milk which are offered at low prices. Further criticism includes: perceived unfair treatment of domestic farmers, waste of energy and increased pollution through unnecessary food transportation and too much packaging.

In the Netherlands the development of the large scale OFSS companies was led by the structure of the distribution channels as well. When in the beginning of the 90s farmer based OFSS took off, one organic wholesalers pioneered the Bag-System and delivered its Natural Food Shops with assorted fresh vegetable and fruit bags. In 1996, the Natural Food Shops could not offer fresh vegetables and fruit due to a lack of space, equipment and turnover. Thus the Bag-Scheme was ideal means for customers, shops and organic wholesalers. In 2001, the two Dutch wholesalers operating a Bag-Scheme were responsible for 78% of all OFSS orders in The Netherlands (35.000 of 45.000 bags/boxes per week) and the farm based Box-Schemes came to a halt. As the Natural Food Stores grew and the supermarkets entered the organic food market, the number of Bag-Schemes declined rapidly due to a rise in the availability of fresh organic produce. Now farmers in the Netherlands are making new attempts to attract customers via direct marketing.

Important Issues of farm based OFSS

Virtually all farm based OFSS in Europe employ Box-Schemes with an average of 150-500 orders per week. They differ significantly in the researched four countries due to the stage of market development. Among farm based systems German Box-Schemes seems to be most advanced in operations, optimising profit for the farm and quality of product and service for the customers.

Two factors contribute to the development of farm based Box-Schemes, as indicated by its product and service features:
(i) Firstly, the state of the Organic Food Market (OFM), expressed in the availability of organic produce and level of consumer awareness and demand.
(ii) Secondly, the farmers ability and willingness to serve the consumer by delivering high product and high service quality.

Development of Box-Schemes according to the Market Life Concept

Employing the Market Life Concept, which predicts a rise of sales after an introduction time followed by stagnation and literally a decline of turnover, Box Schemes in Europe developed according to five distinctive stages over time, as shown in exhibit 5 below:

Exhibit 5 “Farm based Box-Schemes Five Stages of Development”

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	One Type Box-System	Multiple Box-System	Adapted Box-System	Individualized Box-System	Internet shop & Box-System
Orders weekly	50-550	120-400	200-400	350-2000	350-2000
Operated by	farmers	farmers	mainly farmers	retailers, but farm based	retailers, but farm based
Portfolio	One standard box of vegetables in two sizes. Fixed price of Box	Three standard boxes of vegetables, fruit and a mixed box in two sizes each. Fixed price of Box	Three to six boxes (i.e. Extra box, Local Food box, mother-baby box) of 2-3 sizes (S,M,L) each. “Likes and Dislikes” possible. Fixed price of Box	10 to 15 boxes (i.e. Cheese-Box, Bread Box), in three sizes. Pricing through the individual produce of the Box.	Combination of Box-scheme and free choice home delivery service. Tendency to self-designed boxes or regular side orders by customers.

Source: HALDY (2004)

The five types are briefly described as follows:

1. One Type Box-System - Introduction phase of the OFM

In the early stages of the OFM when no distribution through retailers is established and thus organic produce is difficult to purchase, a few customers seek to buy organic produce from the nearest farm. The farm offers one standard type of box, usually vegetables in two sizes of own produce. Customers are enthusiastic about the newness of this system and accept relative low service/product features. The supportive aspect of the farm is an important issue. This system is to be found at the farm-based OFFS in Denmark.

2. Multiple Box-System - Introduction/early maturing stage of the OFM

In the marketplace, the availability of organic produce in the OFM is rising, characterised as the introduction phase, but fresh produce are scarce or high priced. Supermarkets will not enter at that early stage, and specialised shops will not have the facilities to offer fresh vegetables and fruits daily. On the other hand, customers of the farm will have experienced the OFSS system for some time and are demanding improvements, suggesting fruit-boxes and other produce. The OFSS company enters the stage of becoming a retailer by buying in produce from the wholesaler and investing in smaller cooling facilities. This system is to be found mainly in the farm based OFSS in the Netherlands.

3. Adapted Box-System - Growth phase

Availability of fresh organic produce is still increasing. Likely entry of multiples at the marketplace, thus price competition with supermarkets. Availability is not the pre-dominant benefit for customers anymore. Issues of freshness, and service aspects become increasingly important. New customers, the so called “early adopters”, will join and have higher expectations of the OFSS service and product features.
The farm reacts by inventing boxes, customised to different customer benefit, like “Local boxes” which only offer produce from the region, or Mother-Baby boxes, which contain only vegetables which are recommended for babies and their breastfeeding mothers. This allows the farm to use its standard procedures of packing, ordering and distribution to grow without major investments or alternations. Profit margins will decline at that stage, due to increasing administration and packing costs. As the bought-in value increases typically at that stage to 60% and more, the waste of unsold produce from the wholesaler becomes an important cost factor.
The last step of this stage is the introduction of “likes” and “dislikes” by which customers can alter their weekly box. This customer information will be attached to the standard boxes. After packing the “dislikes”, vegetables will be removed and replaced by “like” products. This leads to individually labelled boxes and the need to administer this information. This stage of OFSS is to be found in the United Kingdom.

4. Individualised Box System - Maturing Growth

The growth phase of the OFM is still ongoing, mainly determined by the policies of the supermarket and the national supportive programs which are the driving force in most of the researched European countries. Organic fresh produce is easy to buy, either in supermarkets or specialised shops, at lower prices than before. OFSS customers are more price sensitive and demand more information about the pricing of the box-content and more information about the OFSS company.
German OFFS companies faced this problem in the second half of the nineties and responded by the invention of PC-linked scales. The standard box, where the customer has only a limited possibly of influence will be replaced through individualised boxes. The OFFS company has to invest in cooling, handling and IT- logistics to secure reliability of fulfilment to the customer's demanding orders. The types of boxes have not necessarily increased in comparison to stage 3, but as each item of the box content will be traced by IT, the customer gains full transparency and full ability to exclude or include certain products from his subscription. At that stage, OFSS companies increase their offerings of added products by catalogues, and start to sell fresh high value items like cheese and meat, as they can be weighted and operations speed up through IT. Each box will be traced individually, often via barcodes. This system is only to be found in Germany.

5. Internet shop & Box-System - Maturing phase

Sales of the OFM are growing slower, which can be seen as a sign of the mature phase. The OFSS companies are likely to enter into competition with each other, with internet/catalogue shops and home-delivery services on availability and service, and on price with the supermarkets. At that stage they have gained core competency in handling the whole range of fresh produce which gives them a competitive advantage on internet/catalogue shops with home-delivery services. OFSS companies are likely to emphasise freshness, service and “closeness to the farmer” as the main features and customer benefits in competition to supermarkets. The subscription scheme is under threat to be replaced by free-choice purchasing of customers. Thus, the following stage would be the declining stage.

The author assumes that the development of Box-Schemes will pass these stages in any free-market economy where organic produce is sought as an alternative to industrialised conventional agronomy. A consumer benefit analysis together with these five stages lays the foundation of the Box-Scheme Development Model. In this model, further characteristics of the operations and marketing of Box-Schemes are shown (HALDY 2004).

Threats to the development Box-Schemes

Farms, as Small and Medium Sized Enterprises in other industries, have very limited resources of time, finance and knowledge. Furthermore, farms have a different cultural and social background which enhances the dominant role of tradition and the role of the sole entrepreneur /farmer in decision making. On the other hand, innovative changes of farms towards sustainable behaviour in social, economic and environmental issues have a mayor impact on society. Following four observed attitudes of farmers might become an obstacle in the development of an OFSS movement in emerging organic food markets:

1. Farm based view

Traditional farmers care primarily for their land, husbandry and family. They are basically concerned about the physical aspects of the produce. On the other hand, direct marketing is a service task and the farmer has to respond to the customers needs. In the early stages of the OFM customers are glad to have access to the physical produce, but during the market development service features and convenience will become more important. Farmers who are not able or willing to expand their offerings will face with a swindling or over aging customer base. This leads to an insufficient quality of the OFSS, and the loss of customers. As the SOIL ASSOCIATION (2001) puts it:
"The biggest threat to the growth of box schemes is from schemes that do not offer a good service and lead to disillusioned customers, thus sourcing the potential market for boxes in general"

Farmers do often restrict themselves only to sell their own produce. Thus, CSAs in the north American climate do mainly deliver for half a year due to the growing season. There are neither ethical nor financial arguments not to sell bought-in produce from colleagues (domestic or abroad) to give the customer the chance to carry on supporting the farm.

REYNOLDS (2000) underpins this finding by suggesting to extend the CSA-model towards a more consumer driven movement:
"To become a high volume distribution channel for organic products, the CSA movement must take consumer preferences seriously. Our research shows that many urban consumers perceive CSA offerings as too seasonal and too erratic. […] Many conclude that if they have to go the natural food store anyway, the extra trip to the pick-up point is not a good use of their time."

2. Self-Satisfaction

Some farmers tend to feel too much self-satisfaction with their developed customer base and level of produce and service. They anticipate their customers and direct marketing techniques to be as stable as the soil they are caring for. On the other hand, producer-consumer relationships in the organic food market are based on the basic changes in behaviour towards a sustainable future. Thus, consumers who are actively involved in an OFSS (Box-Scheme, TEI-KEI and CSA) expect the farmer to foster growth of the farm, promote the idea and keep on being innovative. Organic farmers find themselves in the role of so called “change agents” and promoters of sustainable developments in economic, social and environmental issues.

3. Myopic

Myopic perspective occurs, when the farmer draws his conclusion mainly on experiences of his direct surroundings. For example: One researched OFSS company surveyed its customers regularly via a questionnaire. The responding customers tick the answers, which show an overall sufficient level of service and quality. Thus, the farmer does not see any need to improve its Box-Scheme. There are several problems inclined with this method:
- The surveys focus only on his current customers - not those potential customers who do not subscribe, because they might perceive the product or service level as not good enough.
- The given questions by the company do not give the customers the opportunity to name missing features of the subscription scheme
- The average questionnaire do not measure the importance of the answers given.
Thus, even in a declining customer base, one will still not know why customers leave, nor what potential new customers are expecting.

4. Pricing below Retail-price level

LASS et al (1995) found in his research that CSA-Shares (Boxes) are under priced. The UC SMALL FARM CENTRE (1995) quotation of CSA pricing is valid for any OFSS:

“The biggest contributing factor for CSA burnout and failure is setting the share [or Box] price too low.”

Farmers are unsure about the value of their produce, service and the benefits for the customers. Farmers in the Netherlands and the United Kingdom sell their produce often cheaper than the retailer, whilst in Germany they gain even higher prices than retailers due to their service efforts. Higher prices are also achieved by the three leading European OFSS companies. The low-pricing strategy of farmers lead to a low-quality image at the customers and do not reflect the increased production, marketing and service effort of the direct selling organic farmers. It results in discouraging farmers from enhancing their service and OFSS, leaving the market to retailer based and bigger OFSS companies.
Farmers who want to start an OFSS have to attract those customers who value their produce and effort and who want to support the farm on a sustainable economic base. Hence, a high quality strategy based on fair market prices should be conducted.

Summary

The producer-consumer movement TEI-KEI evolved in Japan during the seventies and consisted of 500-1000 groups in 2003 with a large market share of organic sales. Its popularity is shrinking with time. TEI-KEI emphasis the support of farms and laid the foundations of organic farming in Japan. It has inspired the CSA movement in the US which was taking off in the eighties, focusing in theory on community building through cost and risk sharing in exchange for food. There are now more than 1000 CSA farms in the US. CSA plays only a limited role in financing organic farms, and is of no importance in terms of market share on organic sales. Box- and Bag-Schemes have emerged in Europe from the beginning of the 90ties, and are now responsible for 3-8% of all organic food sales. Box-Schemes combine farm-supportive aspects of subscriptions with retailer-like customer service.
Farm based Box-Schemes develop through five distinctive stages towards increased convenience for customers and individualisation of the Box, along the phases of the maturing organic food market. Further operational implications of the development of farm based Box-Schemes have to be addressed.

It can be stated that direct marketing through Box-Schemes, TEI-KEI and CSA challenge the traditional roles of the farmer, and will change their self-perception towards a service provider instead of only the production of physical food products. Organically managed farms play a key role in fostering the change towards a sustainable and healthy development in social, economic and ecological issues.

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Retrospect and perspective of Chinese organic food development

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Abstract: Emergence background, production status quo, developing course and standards and statutes of Chinese organic food are introduced in this paper. Favorable conditions of China organic agriculture development are analyzed and the problems in China organic food development are pointed out and countermeasures of China's organic food development are put forward.

Key words: organic food, development, China

Emergence background

Long history of Chinese traditional agriculture made a great contribution to the emergence of world (including China) organic food. Chinese traditional agriculture is well known all over the world for its sustaining high yield in several thousand years at mean time protecting environment. Before modern agriculture, excreta of human and animal was returned to field as crop fertilizer, food waste was used as animal feed and sediment from eroded soil in canals and ponds was dug out and utilized as fertilizer. Chinese traditional agriculture caused world's attention. Organic agriculture in the world learned a lot from Chinese traditional agriculture. Almost a hundred years ago, in 1909, an American scholar, Mr. King, who was director of the bureau of land management of American agriculture ministry, made a field visit to China's rural areas for figuring out the secret of long sustainability of Chinese traditional agriculture. After the visit, he wrote a book "Farmers in 4000 years". He wrote in this book: The reason why Chinese traditional agriculture sustained such a long history was that Chinese farmers were bright, diligent and frugal, and good at enhancing soil utility efficiency by reasonably using time and space and making soil fertile by returning all wastes, such as human and animal manure, canal sludge into soil. In early 1930th, after carefully studying King's book, Sir Albert Howard, a British gentleman being regarded as the founder of organic farming, put forward the thought of organic agriculture. Under the influence of Howard, J.I. Rodale created a organic farm in California, USA in 1940 and engaged in organic practice.

Chinese national wide ecological agriculture demonstration projects were direct driving forces and world organic agriculture movement was indirect motive force for the production of Chinese organic food. In early 1980th, under the help and participation of research institutes, universities and governments at different levels, ecological agriculture experiments were made in county, township, village and household level. Now there are more than 100 national level ecological agriculture experiment and demonstration counties and there is a total of one seventh of counties in China involved in experiments and demonstrations if those of local levels are considered together. A set of ecological agriculture technology system, such as integrated pest management, integrated plant nutrient management, crop rotation system, mixed farming system, multi-matured planting system, combination technologies of crop planting and animal raising, industry and agriculture, city and rural area, environment and energy has been formed during experiments and demonstrations, which set a technical base for production of organic food. Here we must point out that China's ecological agriculture is different from that of western countries, similar to world sustainable agriculture, in which synthetic chemicals are allowed in a reasonable range. Western ecological agriculture is organic agriculture, in which synthetic chemicals are forbidden.

During the development of China's ecological agriculture, international organic agriculture movement developed very fast and a lot of foreign companies of organic food came to China, which add another force for Chinese organic food development.

Production status quo

According to rough estimation of authenticated institutes, until the end of 2003, about 1100 enterprises and 2000 products (part of them were authenticated repeatedly) were awarded organic food certifications by foreign and domestic authenticated institutes, about half of which were authenticated by domestic institutes, while another half by foreign institutes. Total production value of these organic foods was 236 million US $, among which, 200 million US $ from crop products, 13.8 million US $ from collected wild crop products, 9.2 million US $ from animal products and 13.7 million US $ from fishery products, earning foreign exchange 17.2 million US $ with 7.3% of exporting rate.

Compared with organic food, Chinese green food develops faster. Until 20th December 2003, there were 4,030 certified green food products with total amount of objects 3,260 tons in 2047 enterprises, among which, numbers of AA grade green food products and enterprises were 119 and 53 respectively. AA grade green food is similar to organic food, except the difference of standard and management. In all the green food products, rice, flour, cooking oil, fruit, tea, meat, liquid milk and milk product amounted to 225.6, 41.9, 21.3, 184.3, 12.9, 10.1 and 182.6 tons respectively with total annual marketing value 8.8 billion US$, earning foreign exchange 131.7 million US$, 12.4% exporting rate. A total of 5,140 thousand hectare of farmland, pasture and water body was monitored. Green food product structure is agriculture and forestry products and their processing products with 56.5%, animal and poultry products with 17.1%, fishery products with 3.3%, beverage products with 17% and other products with 6.1%.

Developing course of Chinese organic food

The course is divided into following three stages:

Studying stage (1990-1994):
The characteristic of this stage is the coming of foreign authenticated institutes who started the development of Chinese organic food. According to the application of the Zhejiang tea company for export and import and the tea trade company of Amsterdam in Netherland, in 1990, Mr. Joe Smillie, inspector of international organic authentication in Canada checked 2 tea farms and 2 factories on tea processing in Zhejiang and Anhui provinces respectively based on the organic tea standard under the trust of organic authenticated institute SKAL. Later on, Beihou tea farm and tea factory in Linan county, Zhejiang province obtained organic tea certificate of SKAL in Netherland, which was the first time when the farm and processing factory in mainland China acquired organic authentication and during authentication, and it was the first time that Chinese experts participated in the organic inspection.
IFOAM found by France, America, England, South Africa and Sweden in 1972 produced a big influence on Chinese organic development. In 1989, rural ecological lab in Nanjing environment science institute of national bureau of environment protection joined IFOAM and became a first member from main land China. Now there are more than 30 IFOAM members in China.

Starting stage (1995-2002):
In this stage, Chinese authenticated institutes were formed and corresponding authenticated work was started and recommended industry standards were formed by institutes or departments based on IFOAM basic standards.
In 1992, Agriculture ministry of China approved to set up China green food development center (CGFDC) who is responsible for authenticated and development management of green food in China. From 1995, CGFDC put forward creatively graded theory of green food, which divided green food into A grade and AA grade (equivalent to organic food). At the same time, fund was invested on research project, China agriculture university, China academy of agriculture science were invited to make research and AA grade green food standard and operation technical rules were formed by referring organic food standards and statutes of IFOAM and Europe, America and Japan.
In 1994, approved by national agency of environment protection, rural ecological research lab of Nanjing environment science institute of national agency of environment protection renamed as "Organic food development center of SEPA, briefly OFDC". Since 1995, more than 300 farms and processing factories have passed OFDC's authentication.

According to basic standard of organic product and processing of IFOAM, referring to organic agriculture production regulations of European committee and standards and rules of organic agriculture associations or organizations in other countries, such as Germany, Sweden, England, America, Australia and New Zealand, combining with related standards of China agriculture production and food industry, OFDC made "certification standard of organic product" (trial implementation) in 1999, which was issued as industry standard by National general agency of environment protection in May, 2001.

In March, 1999, Tea institute of China academy of agriculture science set up organic tea research development center (OTRDC), being specially responsible for inspection and authentication of organic tea farms, factories for tea processing and fertilizer for tea farm. In 2003, OTRDC obtained registration of National certification and approval supervision management committee. More than 200 tea farms and factories of tea processing were authenticated by OTRDC.

Based on strategic arrangement promoting harmonized development of green food, organic food and no public hazard food of the "action plan of no public hazard food" and demand of national agriculture ministry, China green food development center formed China organic food certified center (COFCC) in the end of October, 2002, which became China's first organic food certified institute registered by National certification approval supervision management committee. According to basic standards of IFOAM and other countries or areas, COFCC made "organic food production technique rules" and trained 76 inspectors all over China. For increasing its influence on enterprises and helping enterprises earn more foreign exchange, COFCC positively engaged in international cooperation, having signed full cooperation agreements with SGS of Europe, JONA and OMIC of Japan. More than 120 enterprises have passed certification of COFCC.

Standardized rapid development stage (2003-)

"Certification approval supervision management rules of people's republic of China" was officially promulgated on first November 2002, which regulated that organic food certification should be universally managed by National certification approval supervision management committee and signified that China's organic development entered standardized stage.

Initially, national organic food certification approval committee in national general bureau of environment protection took charge in approval of organic food certification institutes. According to above new rule, national general bureau of environment protection was transferring this function to National certification approval supervision management committee. Until now, 7 full time or part time institutes in all get certification permission of National certification approval supervision management committee.

In 2003, National certification approval supervision management committee organized related departments to draft "national organic food standard" and "organic product certification management method".

There are several foreign certification institutes in China now. Organic crop improved association, an American organic certification institute came to China in 1995, which was earliest foreign institute in China, and which cooperated with OFDC and formed its sub-association in Nanjing China. Later on, ECOCERT of France, BCS of Germany, IMO of Sweden, JONA and OMIC of Japan set up their offices in Beijing, Changsha, Nanjing and Shanghai respectively, which engaged in organic inspection and certification. More than 500 enterprises were awarded certifications by foreign certification institutes.

Standards and statutes

Owing to lack of compulsory national standards of organic food certification, each certification institute carries out its own certification standard. From above description, CGFDC, OFDC, COFCC and OTRDC use different standards. Foreign certification institute implements its country's standards to make certification in China. Certification institutes in China from European countries follow European statutes (EEC2092/91), American certification institutes carry out American national organic standards (NOP) and Japanese certification institutes implement quality standards of agriculture and forestry products (JAS). Although above standards of organic product certification are different, basic demands and principles, such as prohibiting use of synthetic agriculture chemicals and GMO technology, regulating conversion period and making buffer zone, advocating rotation system, controlling marketing amount, show no big difference. But, practical difference of standards during implementing certification results in some certification chaos.

On June 19 2001, national general bureau of environment protection officially promulgated "organic food certification management methods" and issued " organic food production and processing technological standards" in the end of 2001.

In August 2003, based on "certification standard of organic product" (trial implementation) made by OFDC in 1999, national certification approval supervision management committee made "organic product production and processing certification standards".

From July 2003, national certification approval supervision management committee started to make organic food national standard. In order to make it fit domestic and international conditions, national certification approval supervision management committee convened many seminars to discuss this problem. Now the standard and corresponding organic product certification approval management methods are under the way of making up.

Favorable conditions of China organic agriculture development

Market demand

Strong demand from international market: According to the research report of international trade center in United Nations in 2002, market volume of organic agriculture product from America, Europe (16 countries), Japan increased from 10 billion US$ in 1997 to 21 billion US$ in 2001. It is predicted that market volume will be further increased to 29-31 billion US$ in 2005 and 100 billion US$ in 2010 and annual increasing rate of world main organic markets in the short and

mid-term will be as high as 10-40%. Developed countries, such as America, Germany and Japan are main countries of organic agriculture products. Although the price of organic food is 1.3-3 folds of ordinary food, demand is over supply in international market, especially in the markets of developed countries.
Domestic market has also a very big potential. Since China adopted an open door policy in 1978, there have been more and more very rich people. These people are willing to pay more money to buy organic food in order to get a better health. Compared with international market, domestic market is much bigger, which have already been proved by only 7% exporting rate of China organic food. According to the prediction of world authority experts, China's rapid economic growth could keep as long as 50 years. As China becomes richer and richer, consumer group of organic food in China will become bigger and bigger, which will certainly promote the China organic food further development.

Old Chinese civilization set a solid foundation for development of China organic food

Influenced by old culture civilization, old Chinese agriculture has healthy and sustainable development philosophical thoughts of organic agriculture. Healthy soil is first important and it is the base of healthy plants and healthy animals. The essence of sustainability is permanence, which emphasizes resource sustainable utilization by keeping permanent soil vitality and utilizing renewable resources as much as possible.

The thought of agriculture resource sustainable utilization and conservation went back several thousands years ago. The importance of protecting lives and life's living environment was understood and first law about protecting biological resources was made in China's Zhou dynasty, which symbolized the germination of China's oldest ecological thought. In Zhou dynasty's law, there were detailed regulations about cutting forest, fishing and hunting. In old philosopher Laozi's "Morality", returning human and animal manure into soil was emphasized.

China feeds one fourth of world population on the only one seventh of world arable land and China agriculture achievements are generally recognized by all over the world, owing to both bright and diligent people and old Chinese civilization and traditional agriculture technology. As the rapid development of industrialization and urbanization, China is facing more and more pollution not only from industry, human life, but also agriculture production. There are many ways to solve these problems. Organic agriculture is one of the best ways. China's state conditions with many people and little arable land determine that China must find its own way of organic agriculture development. China's traditional agriculture technology plus modern new and high technology make this way possible.

Natural conditions are complicated and diverse, making China famous in bio diversity

China is situated in north latitude 351~5334 and east longitude 7340~13505, with 5,500 Km distance from south to north and 5,200 Km from east to west and total national land area 96 million Km2.

China's diverse natural geographical, weather, hydrological and soil conditions are very favorable for growth of different kinds of plants, animals and microorganisms, making China one of the most diverse countries in the world bio species. China's special history condition in geology period offered refugee for many old species or originated area for many new varieties. Based on the numbers of vertebrate, Papillionidae of insects and high level plants, in 1990, McNeely etc determined following 12 countries as " huge bio diverse countries": Mexico, Colombia, Ecuador, Peru, Brazil, Zaire, Madagascar, China, India, Malaysia, Indonesia and Australia. The 12 countries in all accounted for 70% of above world bio species. Animal species are used as examples for explaining bio-diversity in China. There are 6347 species of vertebrates in China accounting for 13.97% of world total figures, among which, 1244 species are birds, making up 13.1% of world species, 3826 species are fish, holding 20.3% of world total numbers, 376 species are reptile, 284 species are amphibian and 581 species are mammals. There are a lot of special species in China. 667 special vertebrate species holding 10.5 of China's total species figures have been known in China so far, among which 98 species go to birds accounting for 7.88% of total bird numbers in China, 404 species are fish, constituting 10.46% of China's total fish species, 25 are reptile, accounting for 6.65% of China's total species, 30 are amphibian, holding 10.56% and 110 species are mammals, accounting for 18.93% of china's total mammals species. China also has a lot of special insects.

Compared with developed countries, China's environment quality is good
Western countries, such as European, America, have entered industrious societies for more than 100 years and pollutions from fossil fuel combustion and development of industry, urbanization and modern agriculture are still serious in these countries, compared with China who started industrialization only from 1949. Following evidences can prove China's good environment quality:

Over standard pollutant content in agriculture product is not the main obstacle of China's exporting agriculture product into international market and lack of common knowledge and basic technique are main obstacle. Compared with the former, the later problem is relatively easy to be solved. Pollutants, like heavy metals, pesticide are accumulated in soil and water body annually which are very difficult to get rid of, because once the environment is polluted, it will be very difficult to rehabilitate. Pollutants in soil and water are absorbed by agriculture product and causes pollution of agriculture products.

Now foreign enterprises are all over China. Before determining investment, some investors first monitored water and other environment qualities and environment quality becomes prerequisite of investment. That more and more foreign enterprises in the past 10 to 20 years came to China is another evidence of China's relatively good environment quality.

There are a lot of longevity counties in China. Even developed region has no exception. There are more than 100 people who are more than 100 years old and are very healthy now in Rugao county Jiangsu province. Good environment quality does not lead to longevity, but longevity definitely comes from good environment quality.

It is very easy now to find a county, a township, a village where is free from industry, life and agriculture pollution. Such places can be found not only in western regions, but also developed coastal areas, like Jiangsu province. Such kinds of place offer unique condition for organic food development.

Economic difference results in very big difference in regional agriculture production and poor regions are potential area for organic food development.
Similar to wide geographical difference, China regional economic difference is also very big, which leads to big difference in agriculture production. Eastern China is much richer than western China and middle China's economic situation is between eastern and western regions. Economic conditions relate closely to input level of agriculture chemicals. Just set the application of chemical fertilizer as an example. In eastern China's coastal area, over application of chemical fertilizer, especially nitrogen fertilizer has caused economic benefit reduction and many environmental problems, such as Eutrophication of lakes and reservoirs, while in western regions, such as Guangxi, Qinghai, inadequate input of chemical fertilizer limits yield potentials. Even in coastal area, like Jiangsu province, regional difference is also big. Suqian, the newly established city in northern Jiangsu province, administrates five counties (region), but its annual financial income only reaches one third of Jiangyin city (county level) in Southern Jiangsu province. Huge regional difference implies a big potential for China's further development. Generally, environment quality and input of chemicals in poor areas are much better and lower than these of developed areas and the poor regions, like China's western area, northern Jiangsu, will be potential area for organic food development. Compared with developed regions, labor in undeveloped area is very cheap and people are willing to use traditional agriculture technology and modern agriculture production is more easily to be transferred into organic agriculture.

Ecological agriculture practice and organic agriculture production have produced a set of ecological and organic agriculture technical systems.

Chinese ecological agriculture construction spends governments' very little money. This small money is only used for making up ecological agriculture construction plan and convening some conference. Even though, ordinary people welcome ecological agriculture. Ordinary people, farmers are very practical. The reason why farmers have so much enthusiasm is that farmers obtain not only ecological benefit but also economical benefit.

Although synthetic chemicals are allowed to use in Chinese ecological agriculture construction, most technology popularized during ecological agriculture construction is easy to be conversed into organic agriculture technology. For example, the technique of raising fish, crabs, shrimps, ducks in paddy field can be easily changed into organic one by using only organic fertilizer and bio control to pests and weeds. Raising animals in paddy field is one of the best ways of biological control to harmful lives and they are very favorable to bio diversity, because animals: fish, crabs and ducks in paddy field are very sensitive to pesticides and herbicides, and pesticides and herbicides are avoided as much as possible for making these animal grow healthily. Bio-gas is another best ecological agriculture technology which has been popularized all over China, which not only solve pollution problems, but also alleviate crisis of shortage of fossil fuel and reduce pollution from combustion of fossil fuels. This technology has a vast adaptability, not only suitable to China's developed area, but also developing area. Now three kinds of bio-gas are being popularized in China, more than 200 m3 bio-gas pool, 50-100 m3 pool and 8-10 m3 pool. The former two kinds are used to make animal manure and urine become precious resources so as to solve pollution from animal farms. The later is extensively used in relatively poor farmers' house. Ordinary farmers love it so much that they praise the governments with the languages full of appreciations. Bio gas's by products, bio gas's solid and liquid is one of the most excellent organic fertilizers and it contains not only effective nutrients but also slow release nutrients with both characteristics of chemical fertilizer and ordinary organic fertilizer, which is the reason why application of bio gas solid and bio gas liquid can increase crop yield. Advantages of bio gas liquid and solid are more than these aspects. Bio gas fermentation of manure and urine not only kills poisonous substances, but also produce healthy matters which have the functions of enhancing life's capability of anti-disease and pest attack and killing some diseases and pests by soaking seeds with bio gas liquid. Therefore bio-gas solid and liquid is ideal organic fertilizer for organic agriculture production.

Chinese government pays attention to organic food production

Chinese government is one of the most powerful governments in the world and the reason why China has developed so fast in the past 25 years is the leadership of powerful Chinese government. Chinese government's powerfulness was proved again by successfully combating SARS and chicken flu started in early last year and early this year.
Government's attention to organic food development can be found in laws, government files and leaders' reports and concrete measures and actions from national level to local level. Here just set Jiangsu province as an example. In order to improve quality of agriculture products, Jiangsu provincial government arranged 6.9 million US$ special funds. According to subsidy rules, a stakeholder whose agriculture product is certified as agriculture product without public hazard, green food organic food can get subsidy 610 US$, 1220 US$ and 3659 US$ respectively and a stakeholder whose land including farmland and water body is certified as none public hazard base in south, middle and north Jiangsu province can get 366,732 and 975 US$ subsidy.

The significance of developing organic food

It is favorable to the protection of environment
Although pollution in China from industry, human life and agriculture is not so serious as that in developed countries, deteriorating trend of environment quality in the past two or three decades is very obvious. In some area, the pollution is very serous. The pollution results from many reasons, fossil fuel combustion leads to acid rain pollution, polluted water discharged from factory, human life results in heavy metal and organic poisonous pollution, agriculture production produces pesticide, herbicide and fertilizer pollution. Pollution control needs the effort of all society, even all the world.
Organic agriculture production is one of the important ways of pollution control. Environment quality of organic food production base must fit the base standard of organic food production. Farsighted stakeholders pay a lot of attention on choosing the base and the ideal base is not polluted presently, but also in the future. Once the base is chosen, polluting projects close to the base will be very difficult to get permission, which is very favorable for controlling industry pollution. Organic food production is the best way to control pollution from agriculture chemicals owing to its regulation of prohibiting use of these chemicals. Although many progresses have been achieved in bettering variety of insecticide, bactericide and herbicide, a lot of problems still exist, compared with that of developed countries. According to research result, total application amount of insecticide, bactericide and herbicide in 1996 were 270,000 tons, 272,000 tons and 603,000 tons, accounting for 71.27%, 9.76% and 15.82% respectively, which was much better than 93.04%, 5.65% and 0.81% in 1980, but obviously much worse than the proportion of 4:4:2 in developed countries. Compared with developed countries, China uses too much insecticide. Development of pesticide with high effectiveness, low poison and low residue is becoming the urgent task of related department. The injure of toxic pesticide shows in many aspects, killing enemy of pests, pest's re-happening rampantly, threatening bio-diversity and threatening human health. Producing grain without using pesticide is a fundamental way of rehabilitating bio diversity of agriculture ecological system. During organic food production only organic fertilizer is used, pollution from chemical fertilizer can be solve effectively. Compared with injure of pesticide, threat of chemical fertilizer is longer and more serious. Eutrofication of lakes and reservoirs, nitrate pollution to underground water relates to chemical fertilizer application. World experience proved that once the water body is polluted, it would be very difficult to recover. Therefore, organic food production is one of the fundamental ways to solve environment problems.

It is beneficial to meet the challenge of China's joining WTO

In 2001, China joined WTO. While WTO benefits China's economic development, the negative influence of WTO should not be neglected. Developed countries use their technical advantages and many excuses to set up a lot of technical barriers to resist products from developing countries. For example, using people's psychology of food safety, governments of western developed countries, like Europe, Japan make more and more strict technical barrier to food products. Monitoring variety of pesticide residue in agriculture products in European countries and Japan become more and more and monitoring standard gets more and more strict. Monitored items of pesticides in grain products in European countries increased from 26 in 1986 to 62 in Jan 1, 1996, these in fruit and vegetables increased from 18 in 1982 to 30 in 1988 and that in tea increased from 6 in 1988 to 62 in 1996 and to 64 in 2000. Monitored items of pesticide in grains in Japan increased from 21 in Jan 1 1987 to 96 in May 1993. While monitored items are increased, the standards are 10 times or 100~200 times stricter than several years before. Following facts also show technical barrier: The monitoring standards to the pesticides that are being used in their home countries are not so high or not so strict, but monitoring standards to the pesticides that are not used are very high or very strict. The situations and standards in different countries are quite different. The existed problem is that every country only considers its own interest and in order to make its maximum interest, the technical barrier will become more and more serious. To develop organic food is one of the best ways to break the technical barrier. Because no pesticides are used in organic food production and there are also no pesticides in the product base, no matter how many monitored items of pesticides and no matter how strict the standards are, the technical barrier to organic food does not exist.

Help solve the problems of farmers, agriculture and rural area

The problems of agriculture, rural area and farmers in China are called "three agriculture problems", which become core problems in China's economic development. Why the problems are so important is that there are many farmers with poor quality, very small arable land in China. More than 64% of Chinese people are farmers and each farmer only has about one fifteenth arable land, while only 2% of American people are farmers who are well educated and have so many cultivated land to farm. Develop organic food helps solve "Three agriculture problems" by increasing labor's quality, alleviating stress of farmers' employment and enhancing competitive capacity of agriculture product. The techniques of production, processing, fresh preserving, storing of China's agriculture products are relatively backward, resulting in high production costs, low appendix value, which are fundamentally caused by farmers' limited knowledge level and poor quality. Technical contribution rate of agriculture production in China is only 30-40%, while that in developed countries is as high as 60-80%. Because of high technical content, organic food production helps increase farmers' knowledge level by training farmers to engage in the production practices according to organic production standards. Organic food production has the characteristics of labor intensive, because agriculture chemicals are not allowed to use in organic agriculture production and using organic manure and biological control to harmful lives in organic food production need more labors, which is a very good way to solve the problems of over rural labor.

The problems in China organic food development

Compared with developed countries, China organic food starts very late, but the development speed is very fast. Following problems emerged during its development should be paid attentions by governments, universities, institutes, related departments and enterprises:
Both domestic and international markets are not developed enough. Most part of the organic food is sold in domestic market, the exporting rate of organic agriculture product accounts for only 7%, which is not a good phenomenon. Domestic market also needs to be developed. According to rough estimation, the proportion of organic food in total foods in China is only 0.2%, which is much lower than the world average, 2-5%.
Organic food standards are not perfect, showing in three aspects: low level standards, low serialized degree of standards and poor identical with international standards. There are no national organic food technical standard and corresponding detailed organic food standards, such as organic vegetables, organic eggplants, organic horticulture, organic rice, organic animal, organic poultry, organic tea, etc. Foreign countries have already set up national organic food standard as "green barrier" by using excuse of food safety and environment protection that is not against the rules of WTO, but China has no similar "barrier", which is one of the important reasons why China's organic food has low exporting rate and foreign organic food is seen all over China. There is a compulsive regulation in Japan that organic agriculture products exporting from foreign counties to Japan should be certified again by Japanese certification institutes and labeled with organic JAS mark, otherwise, these products should not be sold as organic agriculture products in Japanese markets and only be sold as ordinary agriculture food. "Law of European organic food" has similar rules, which regulates that organic food would be forbidden, if exporting countries have not set up security system of organic food fitting to demands of European laws. The environment factors affecting China's food export are pesticides and poisonous substances in agriculture products. China must stop applying pesticide varieties that have already been forbidden in developed countries. Compared with these in developed countries, monitored items of pesticides in China are few and should be increased. There are only 62 variety of pesticides in China food that are regulated with maximum allowable residue amounts, which are lower than 96 in Japan, 115 in America and 87 in Canada. In addition, maximum pesticide residue amounts in different foods are regulated in developed countries. For example, 52 varieties of pesticides in rice in Japan, 128 in pear fruit in America and 168 in vegetables in Germany are compulsively monitored. But such standards in China's different foods do not exist.
There is no national organic food development plan and the management is not so scientific. China organic food development started late, but developed fast. If China organic food wants to chess up international tide, a scientific organic food development plan is necessary. Science, technology and management are considered "three big important factors" of modernization which are promoted and limited each other, and among which management is more important, since the development of science and technology is realized by management. From the development experiences of organic food in developed countries, rapid and slow organic food

development depends to some degree on the high or low management level. The reason of organic food rapid development in Germany is that good management and plan by effectively using man power, object power and resources and international organic exhibition is hold annually in Germany, which promotes further development of organic food. Following three contents belongs to organic food management: making up organic food plan, organizing and harmonizing organic food development work and supervising work of organic food development, among which organic food development plan is a basic work. At the beginning, the organic food development work was lack of scientific plan and was not caused by people's attention. Later on, following problems emerged, such as not so high product quality, less obvious product specialty, chaos market competition caused by no scientific plan, poor management, etc.

Education and scientific and technological research do not fit the demand of organic food rapid development. Most people, even who are engaged in organic food management, have very poor knowledge about organic food and they understand organic agriculture as that no chemical fertilizer, pesticides and additives are allowed to use in agriculture production. Organic agriculture's multi-functions of environment production, meeting WTO challenges, solving problems of farmers, agriculture and rural area are poorly understood. Some universities and agriculture technical colleges in European countries, Korea established principles of organic agriculture and a lot of technical people with knowledge of agriculture, animal husbandry and fishery are cultivated for organic food production and they play very important role in organic agriculture production. There is no specialized subject of organic agriculture in China. Similar to education, scientific and technical research is also poor. Scientists in developed countries, like America, European countries were very interested in China's organic agriculture and they said they learned a lot from China in organic agriculture production and they were surprised by China's sustainable development for more than 5000 years in adopting organic agriculture practice. Compared with foreign scholars' enthusiasm, Chinese scholars' enthusiasm is not so high, which is very pity. Traditional agriculture technology is one of China's state treasures, which must be paid high attention by all Chinese people.

Countermeasures of China's organic food development

Setting up marketing system of organic food

The domestic and international markets must be linked together. As economic globalization, markets both home and abroad are merged together, forming the phenomena that domestic market is internationalized and international market is domesticated. China's agriculture products are not only facing strict choice of international markets, but also facing severe competition with foreign products in domestic markets. Based on the facts of bigger and bigger demand to organic food in developed countries, developing organic food that satisfies the requirements of people in these countries is very important for China's organic food occupying international markets. Because China's richness in bio diversity, producing organic food specialized in China has a long-term strategic significance. Because of a big regional difference in China, different policy for organic food market development should be made. Organic markets should be first set up in eastern coastal areas, big cities. And consumers with high income and high knowledge are more willing to consume organic food, therefore, these people should be seriously studied for market exports.

Scattered farmers should be linked with markets by establishing organic farmer association, developing order organic agriculture, encouraging dragon enterprises of organic food offer "object technical fruits". Now China's organic food market is in a starting stage and when developing our domestic organic food market, we must overcome the shortcomings of small scale and scattered agriculture with high cost, not so high agriculture product quality, low production rate per labor, slow market information and slow service after marketing. To overcome the shortcomings, socialized service organizations, such as organic agriculture or organic food specialized association, cooperation economic organization and farmer brokers, should be set up by popularizing the models of "enterprises plus household" or "enterprises plus broker plus households". The most welcomed way is organic order agriculture, which avoid farmers' market risk. Dragon organic food enterprises serve farmers object technical fruits, such as high quality organic seeds, seedlings, and offer free technical service by helping farmers master advanced organic agriculture production technology, which is proved another good way of linking farmers and markets.

Forming mechanism of fair market competition. Bad competition emerged in exporting China's organic bee honey and organic tea to international markets, which is very bad for China's organic food's occupying international markets. In order to solve this problem and promote healthy development of China's organic food development, a set of fair competition laws should be made at the beginning of organic food market development.

Perfecting organic food standards and encouraging export enterprises' implementation to these standards

The national organic food technical standards and national technical standards of different kinds of organic foods should be made as soon as possible by referring international standards and thoroughly analyzing China's true situations. The standards of each food should include contents of environment of production base, techniques of production and animal raising, processing, packaging, storage and transportation, quality, trade techniques, certification. In order to promote China's organic food exporting rate, the work of mutual recognition of China's organic food standards and certifications between China and other countries, especially developed countries should be put into agenda.
Enhance standardized production level of organic agriculture production export enterprises by guiding enterprises' strict adopting standards of agriculture production, processing and trade. Export enterprises of agriculture products should have the consciousnesses of quality, famous

brand. If possible, production and processing in exporting enterprises should be conducted by using international standards, foreign standards, even standards of exporting target countries, which can overcome "green barrier" from target countries.

Make China organic food development plan

Making an organic food development plan is a government behavior. Government's role is indispensable. Government should convene exports related to organic food development to collect and analyze different kinds of information for making a scientific plan. Once the plan is made, government should organize different departments to carry it out.

To make a good organic food development plan, following aspects should be considered. First, the relationship between organic agriculture and conventional agriculture, organic food and conventional food should be figured out. A good plan must base on the scientific market prediction and market orientation. Following questions should be very clear before making a plan: what products should be developed, will the products be sold in developed countries, or domestic markets, in a metropolis, in a residential area for distinguished people, for baby, old people, or woman, for knowledge people, rich people or ordinary consumers? According to scientific market prediction and local real situation, the proportion of organic food in ordinary food and developing targets in long term, mid term and short term should be determined.

Compared with less polluted area, the rate of organic food in ordinary food and organic food development speed should be small and slow in relatively high polluted areas. Second, the plan must include different industries, like crop, animal, fishery, different sectors, like production, marketing and policy support, and must determine priority projects. Third, the principles of sustainable development, harmonization and industrialization, suiting measures to local conditions must be applied in making organic food development plan.

Strengthening theoretical and technical research of organic food and popularizing the basic knowledge about organic food.

Advancement of science and technology is a driving force and sources of national economic development and advancement of theoretical and technical research of organic food is motive force of organic food development. Compared with foreign countries, both developed countries and developing countries, China has more advantages in organic food development, such as long term traditional agriculture history, extensive application of organic agriculture technology in China's undeveloped area, such as western areas, mountain areas, minority areas. Bright and diligent Chinese people create many suitable organic food production technologies and some of these technologies can produce both obvious economic and ecological benefits. For example, bio chain technology existed extensively in all over Jiangsu province, has brought farmers high income and good environment. Unfortunately, these kinds of technologies are not fully studied, which seriously limits the further development of organic food.

Perspective

Like organic food is very popular in developed countries, organic food will become more and more important in China as China's rapid economic development. National standards and plan of organic food will be made in not so long time. Technologies of high yields and high output in organic production suited to China's state situation will be available by diligent work of China's scientists and exports. Organic food markets will be set up and a set of policy support systems will be made and organic food development will play more and more important role in China's economic development and environment protection.

Reference (omit)

NUTRITION AND FOOD SECURITY IN INDIA THROUGH LOCAL MARKETING OF MINOR MILLETS AND MEDICINAL PLANTS INTRODUCTION

Dr.Anne Victoria, MBBS and Mr. P.Mariaselvam.

The Politicians and Scientists in India who will favour chemical farming give the reason of 'Food Security' to the growing population. The vocabulary among the farmers and the general population has also changed. Among farmers 'Crop' means the monoculture of Wheat and Sugarcane in the Northern states. 'Food means Wheat, Potatoes and hardly vegetables. In the Southern states 'Crop' means monoculture of Paddy, Banana and Sugarcane. 'Food' means "Rice meal". The bio diversity of crops and the varieties of food has been forgotten. Most of the people think that the traditional ways of cropping and eating were appropriate for much lesser population and the varieties in food item is a luxury now. Some think because of chemical farming system and the food containing chemicals, only chemical medicines could cure the ever increasing diseases. Herbal medicines were healing only in the past when food was not containing any chemicals. We are working to change the above mentioned false conceptions and work towards "Organic Farming Movement" and "Revitalization of Local Health Tradition".

I **PROMOTION OF ORGANIC AGRICULTURAL MOVEMENT**

A. Study among selected village level workers

Since 1990 People's Agricultural Farm (NGO) has been promoting Organic Agricultural Movement. From 15 villages, village level workers and women farmers who already know some local health tradition were chosen. Exercises like "Participatory Rural Appraisal" (PRA) helped to bring their knowledge and practices of Organic farming and Herbal medicine. The study revealed the following,

- ➢ Organic farming was the traditional practice till 1975
- ➢ Farmers were very reluctant to accept the chemical farming in the beginning but now they are very hesitant to return to organic farming.
- ➢ The knowledge and practices are not completely forgotten.
- ➢ Only a few farmers are now willing to take up organic farming practice on trail basis and only in small plots. The family members express their displeasure to become completely organic.

B. Training

Following the study among the village workers, a three months training was organized. The village level workers were prepared to take up organic farming and herbal medicine practices each in their own village.

C. Methodology adopted

Each village level worker organized women into 'women groups' and farmers into an 'Organic Farmers' Sangha'.

D. More trainings in the villages

The village level workers organize two types of trainings in their villages

- Training in Organic Farming Technology.
- Training in use of Herbal Medicine

Follow up trainings were also organized. Cultural programmes were conducted at village mass gatherings to instill the values of organic farming and herbal medicine.

E. Out come of programme in the villages

- Few farmers in 15 villages had tried organic farming in a limited area.
- In each of these villages 1-5 Kitchen Herbal Garden (KHG) were established from where the village people collected medicinal plants and used whenever they needed.
- Publishing of "Herbal Medicine People Know Of" is an outcome.

Intervention of FRLHT since 1996-2003.

There were two dimensions in this intervention.

1. **Conservation – both exsitu and insitu of medicinal plants**
2. **Revitalization of local health traditions**

We participated in the exsitu conservation in our 13 acres land which was once a reserve forest. This land was part of an area which was deforested and given to Ceylon repartriates. Because of wrong land use this land became degraded. Through the financial assistance of FRLHT this became a rich regenerated natural forest. About 500 different types of plants are there among which 200 are medicinal.

A large nursery for medicinal plants was established from which out reach was done to 3000 KHG each year. The concept was that the use of 10-15 different medicinal plants could take care of the basic primary health of families. PRA exercises were conducted with the elderly women from the villages and a priority list of plants that were used by them and the diseases that occurred commonly was prepared. The diseases listed by them are explained and the treatment scheduled prepared in discussion with them. The following list has been prepared from their priority list:

Botanical Name	Common Name	Source
Acalypha indica	Kuppaimeni	Wild Collection
Adathoda vasica	Adathoda	Cultivated
Aloe vera	Kumari	Wild &Cultivated
Alternanthera sessilis	Ponnanganni	Cultivate
Azadirachta indica	Neem	Cultivated
Breyani retusa	Thavasikeerai	Cultivated
Cardiospermum helicacabum	Mudakkattan	Wild
Centella asiatica	Vallarai	Cultivated&Wild
Coccinia indica	Kovai	Wild
Cyanodan dactylon	Arugampul	Wild &Cultivated
Eclypta alba	Karsalai	Wild &Cultivated
Hibiscus rosasinensis	Shoe flower	Cultivated
Ionidium scffructicosum	Orithal thamarai	Wild
Lawsonia inermis	Maruthani	Cultivated
Leucas aspera	Thumbai	Wild
Mimosa pudica	Touch-me-not	Wild
Murraya koenigii	Karivembu	Cultivated&Wild
Ocimum sanctum	Tulasi	Wild &Cultivated
Phyllanthus niruri	Keelanelli	Wild &Cultivated
Psidium guajava	Guava	Cultivated
Ricinus communis	Castor	Cultivated
Syzygium cumini	Jamun	Wild &Cultivated
Solanum trilobatum	Thuthuvalai	Wild &Cultivated

The above mentioned medicinal plants were grown and fresh preparations were made and used.

Training in Herbal Medicine Preparation

Herbal preparations for future uses are also needed. So training was given in such ready made preparation.

The women SHG groups were trained to prepare such medicines and sell to people of the villages which could sustain the services of the village level workers. They were given a medicine kit with about 10 types of medicines for the service of the village people. The simple preparations that were taught are: The Medicinal Plants that were selected for the Home Herbal garden can be use for making medicines for future uses

HERBAL MEDICINE FOR LOCAL MARKETING

I. Sooranams

1. Ashta Sooranam
2. Thiripala
3. Jeera
4. Nellikkai
5. Kadukkai
6. Bath powder
7. Shampoo

II. Lehiyams (internal use)

1. Kumari Lehiyam
2. Thuthuvalai
3. Adathoda

8. Diacure soornam

III. Thailams

1. Karpura Thailam
2. Veppalai
3. Hair Oil
4. Mathan
5. Pinda Thailam

HEALTH CARE ACTIVITIES AMONG WOMEN GROUPS

The following health conditions are prioritized and listed below along with the preparations that can be made and used:

Health condition: 1 Anemia: It is quite prevalent among our women and children.

What is Anemia?

It is not less quantity of blood in the human body but refers to the quality of oxygen carrying capacity of blood in circulation. One ml of blood contains 4.5 millon Red blood cells (RBC). The haemoglobin content is much less which is measurable by simple Calorific Comparison test. For a healthy living atleast 16 g % is required but we find as less as 6-8 g% among our women and children.

Explanation of the causes of Anemia

Strategies adopted are group games

Game no 1.

A group of 10 16 women sit in a circle each has a placard of one of the causes of anemia given below

1. Malnutrition
2. Accidents- Sudden loss of blood
3. Burns
4. Menorrhagia
5. Repeated pregnancies
6. Repeated abortions
7. Complicated child birth with a lot of blood loss
8. Parasities in the digestive system, mainly hook worms. One hook worm takes 0.03-0.15 ml blood/day. 1000 hook worms take 30-150 ml blood/day
9. Bleeding Plies
10. Bleeding Gastric ulcers
11. Cancers
12. Frequent dysenteries

13. Malarial fever
14. Allopathic treatment for Leprosy
15. Allopathic treatment for Typhoid
16. Works in dyeing and pesticide companies

Game no 2 Snake and Ladder

Snake: Causes

1. Cancer
2. Malnutrition
3. Dysentries
4. Menorrhagia
5. Bleeding after delivery
6. Plies
7. Work with pesticides

Ladder: Remedies

1. Eating balanced food
2. Eating dates
3. Deworming
4. Eating jaggery
5. Eating Hibiscus flower daily

Game no 3 Choose your food wisely

All different verities of food with prices are exhibited. In a group of 6 women they have to choose food items for their family of four members within cost of Rs. 50 which is their daily average income. They must explain aloud to others why they choose such food.

Prevention of Marasmus and Kwashiorkar- Carbohydrate and Protein deficiency diseases

Preparation of Organic Navadanya Drink

The following Cereals, Pulses and Nuts are used in preparation.

1. Ragi ½ kg
2. Thinai ½ kg
3. Varagu ½ kg
4. Pearl millet ½ kg
5. Sorghum ½ kg
6. Wheat ½ kg
7. Green gram ½ kg
8. Ground nut ½ kg
9. Puffed Bengal gram ½ kg
10. Cashew nut 100 g
11. Cardamum 10 g

The various constituents are cleaned, fried separately and then mixed together and powdered. This is Navadanya (nine types of food grains).

Preparation of Porridge

One teaspoon of this Navadanya powder and ½ tablespoon of jaggery is mixed in one tumbler (150 ml) of water. This is boiled, strring all the time till it cooks and becomes sticky and semi solid. This I cooled and drunk for good health.

This drink is good for all specially for children, the elderly and convalescents.

Herbal species for Nutritional garden

1. Hibiscus rosasinensis
2. Eclypta alba
3. Murraya koenigii
4. Thavasi keerai
5. Alternanthera
6. Solanum nigrum

Health Condition: 2

Various Vitamin Deficiencies

a. Night Blindness
   Dimness of vision among the people above 35 years are very common in the villages. These indicate vit. A deficiency. Kitchen Herbal Garden are designed to grow guava, Papaya, Curry leaves, Alternanthera indica, thavasi keerai and Phyllanthus emblica.
b. Ulcers in mouth; Skin Problems, burning heals are common. These indicate Vit. B deficiency. Different types of greens like Solanum nigrum, Thavasi keerai, Alternanthera and Karisalai are grown in the KHG.
c. Ulcers in the mouth, loose bleeding gums indicate Vit. C deficiency. Amla, Guava, Papaya, Curry leaves, Alternanthera indica and Phyllanthus emblica.
   Ready made herbal medicines are Thiripala soornam and Karisalai soornam

Health condition: 3

Joint pain is common among the women above the age of 30 and more elderly men.

Causes:

- Increasing body weight
- Carrying heavy weight on head, hip and back
- Work done standing long hours
- Cycling continuously long hours
- Malnutrition
- Anemia
- Diseases like Rheumatic, Rheumatoid fever and bone tuberculosis
- Eating mostly cooked food with residual pesticides

- Psychological problems
- Imbalance of harmones as during menopause in women

  Prevention:
- Avoid the above mentioned cause
- Eating more of raw- diet, fruits
- Avoiding constipation
- Observance of periodical fasts
- Drinking water stored in copper pots

Herbal Remedies

- Soak a little green gram, 2 cloves of garlic and a teaspoon of powdered fenugreek seeds in a tumbler of water overnight. Early in the morning filter this water and drink. In addition to that drink two tumblers of water.
- Smear gingelly oil over a leaf of Ricinus communis. Warm it and apply over the affected joint.
- Grind leaves of Kovai to a paste and apply over the affected joint
- Take Mudakkathan in the form of pepper water or with dosai.

  Ready made herbal preparation
- External application of Karpoora Thailam (Camphor + Coconut oil + Few herbs)

Health condition: 4

Causes:

- Chronic Constipation
- Psychological problems
- Very pungent oily food without vegetables and greens
- Working long hours in very hot situation like furnace
- Inadequate exercises and yoga
- Avoiding the cause is very important

Herbal Remedies

- Tripala soornam, daily 1 teaspoon at bedtime
- Eating Abutilon tender leaves as greens at noon
- External application of leaves of Abutilon smeared with castor oil on the affected painful part.

Health condition: 5 Fever

Fever is a symptom of many health conditions like,

- Tuberculosis
- Typhoid
- Viral infection – e.g. Mums, Measles and Influenza
- All bacterial infection
- All conditions of pus formation in any part of the body

Correct diagnosis could be done with watching the type of fever. In the villages where laboratory diagnosis is remote and expensive

Herbal remedies

Fresh decoction (100 ml) of the herbs below is taken twice a day for one week

- Mollugo – Whole plant
- Tinospora cordifolia – brown stem
- Andrographis paniculata leaves
- Azadirachta indica- bark
- A piece of dry ginger and jaggery

For fever due to cold, influenza and respiratory infection

- Leaves of Adathoda vasica
- Leaves of Solanum trilobatum
- Leaves of Anisomelos malabarica
- Stem of Tinospora cardifolia
- A piece of dry ginger
- Black pepper and palm candy or jaggey

For fever of viral origin

- Bark of Sesbania grandiflora
- Leaves of Azadirachta indica
- A piece of dry rhizome of Curcuma longa

External application over viral eruptions

- Ground leaves of Azadirachta indica and a piece of dry rhizome of Curcuma longa to paste and apply.

For fever originating from Tuberculosis and respiratory infection

- Whole plant of Evolvulus
- Leaves of Adathoda visica
- Whole plant of Inbural

For fever of Typhoid and Paratyphoid

- Whole plant of Evolvulus
- Leaves of Adathoda visica
- Leaves of Solanum trilobatum
- Whole plant of Mollugo

Health condition: 6 Indigestion, Gas troubles and Abdominal Pain

Causes:
- Over eating of cooked foods and over ripe fruits
- Eating very pungent oily food
- Eating contaminated food
- Eating uncooked and partially cooked food
- Eating too fast in a hurry without chewing
- Frequent eating without adequate interval
- Eating heavily after fasting

Prevention:
- Avoid all the above mentioned causes
- Immediately after eating
  1. A piece of fresh ginger
  2. A few corns of black pepper
  3. Coriander seeds

Ready made preparation

Ashta soorna – ½ tablespoon after food every one hour, when in trouble.

Health condition: 7 Ulcers in mouth and stomach

Causes:
- Malnutrition and Vitamin deficiencies
- Psychological problems
- Eating pungent oily food

Prevention:

Avoid the causes

Herbal remedies

Fresh decoction prepared from some medicinal plants 100 ml twice a day for 3 days
- Leaves of Tamarinda indica and Pongamia
- Leaves of Gymnema sylvesta – handful
- Small onion – 10
- Jeera – 1 tablespoon

Drinking fresh extract of the following
- Bark of Banana tree

- Solanum nigrum leaves
- Sesbania grandiflora

Ground paste of the following
- Murraya koenigi leaves
- Fenugreek leaves
- Unripe fruits of Pomegranate
- Tender leaves of Guava, Mango, Tulsi, Cassia auriculata and Neem

Readymade Preparations
- Tripala soornam
- Cassia auriculata soornam

Health condition: 8 Diarrhoeas and Dysenteries

Causes:
- Eating too much of cooked and contaminated food, over ripe fruits
- Indigestion not treated in time
- Infection

Prevention:
- Best is to avoid the causes

Herbal remedies:

Eating a small ball to the size of an Amla fruit, the following medicinal plants
- Centella asiatica leaves
- Agele marmelos
- Murraya koenigi
- Unripe fruit- Pomegranate
- Aloe barbadensis – the gel with one teaspoon of jeera and palm candy

Bark of Cassia auriculata
Seed of Mango fruit
Rind of Pomegranate fruit

Health condition: 9 Jaundice

Causes:
- Infections
- Last stage of cancers

- Consumption of liquors
- Blocking of gall bladder duct by stones, cancers etc.,

Prevention
- Correct diagnosis by laboratory tests
- Correction of surgical cases by appropriate surgery

Herbal remedies for viral infection
- Diet restrictions are very essential
- Drinking fruit juices, glucose drink
- Avoid oil. Chilli and tamarind
- Better to eat easily digestible fully boiled rice gruel
- Eating on empty stomach for 7 days the ground paste of following medicinal plants

Phyllanthus niruri whole plant 4 + small onions 10 + one teaspoon of jeera in one tumbler of fresh goat's milk or water.
Ricinus communis five leaves
Cassia leaves handful + one teaspoon of jeera
Alternanthera leaves
Manjal karisalai
Centella asiatica leaves a handful

Health condition: 10 Skin diseases

Causes:
- Lack of hygiene
- Wearing tight synthetic cloth
- Psychological problems
- Infections, Infestations by parasites
- Malnutrition vitamin deficiencies

Prevention: Avoiding the causes

a. Scabies- Caused by infestation of itch mites.
Herbal remedies:
External application of the ground paste of Acalypha indica leaves and a piece of dried Curcuma longa.

b. Itching patches
Causes:
- Allergy to synthetic clothes, footwear and metallic jewels
- Psychological problems

Prevention: Avoiding the causes

Herbal remedies

External application of the ground paste of the following

- Ficus religiosa leaves
- Hibiscus rosasinensis flowers
- Achalypha indica leaves + a piece of dried rhizome of Curcuma longa

c. Psoriasis

Causes:

In addition to the causes for skin disease mentioned above it includes chromosomal disorder.

Remedy

Application of urine of a pregnant cow all over the body

Herbal remedy

External application of Veppalai thailam

Health condition: 11 Poisonous bites

Scorpion stinging first aid- tying a rope above place of

- Eating a piece of root of Achyranthus aspera + 3 corms of black pepper, folded in 3 betel vine leaves
- External application of ground paste of root of Achyranthus aspera
- Eating three flowers of Calotropis gigantean floded within betel vine leaves
- External application of lime stone

Centepede bite and skin contact

External application of the following

- Latex of Calotropis gigantean
- Lime stone
- Ground paste of Euphorbia heterophylla

Snake bite – First aid only

First aid administration of tying a rope above the point of bite

Not letting to walk

External applications of banana stem extract and drinking of the same

Eating ground paste of leaves of Andrographis paniculata and root of Aristalochia bradiolata

Women's special health problems

Abdominal pain during menstruation

Causes:

- Psychological problems
- Sedentary life

- Malnutrition

Prevention

- Avoiding the causes
- Improvement of life style to become more active, less self forgetting

Herbal remedies

- Eating 2-3 teaspoon of fenugreek seeds with sour curds
- Eating early morning on empty stomach, powdered roasted fenugreek seeds and drinking a tumbler of cold water
- Taking fresh extract of banana stems or flowers twice a day on the 1st day of menstruation. Ground paste of Melia azadirachta and one teaspoon of jeera
- Ground paste of handful of tender leaves of Neem
- Fresh extract of a handful leaves of Leucas aaspera
- Decoction of a few flowers of Hibiscus rosasinensis and a few corns of pepper
- Decoction of a few branches of Mimosa pudica

Excessive bleeding during menstrual periods

Causes:

- Psychological problems
- Tumours in the reproductive tract

Prevention:

Before menopause correct diagnosis must be done and cause must be removed

Remedies:

- Taking fresh extract of either stem or flowers of Banana or both
- Taking fresh extract of bark of jack fruit tree
- Taking fresh extract of flowers of Coconut tree and stem
- Taking decoction of Mimosa pudica
- Taking decoction of barks of Mango, Syzygium cumini and Ficus bengalensis
- Keeping the bark of Uthira Vengan pattai in 1 tumbler of water overnight and taking it early in the morning

Leucorrhoea or White discharge

Causes:

- Lack of hygienic practices
- Malnutrition and Anemia
- Infections in the reproductive tract
- Tumors in the reproductive tract
- Venereal diseases and HIV

Prevention:

Correct diagnosis must be done and treated adequately

Herbal remedies

- Taking a ground paste of Centella asiatica and 1 tsp of jeera with milk or old rice water or cold water, early in the morning for 3-5 days
- Ground paste of Agele marmelos leaves, 1 tsp of jeera and 5-7 onions for 3-5 days
- Ground paste of I tsp of jeera and a few onion with milk
- Ground paste of Enicostemma, 1 tsp of jeera and a few onions with old rice water with salt
- Ground paste of root of Cynodan dactylon with milk
- Ground paste if Ionidium suffuticosum
- Ground paste of Henna with milk
- Ground paste of Euphorbia hirta and Centella asiatica with Goat's milk
- Taking the contents of leaf of aloe vera and palm candy
- Overnight, keeping 3 tsp of Fenugreek seeds within a split leaf of Aloe vera and keeping it over the roof. Eating the soaked Fenugreek seeds the next day morning on empty stomach
- Eating ground paste of Cassytha filiformis
- Ground paste of Kizhannelli, Centella asiatica and Leucas aspera with goat's milk
- Decoction of Hemidesmus indicus
- Ground paste of Cassia occidentalis, Cassia auriculata, Henna, Centella asiatica, Abutilon indicum, Achyranthus aspera equal amount, Goat's kidney 50 g, a piece of root of Hemidesmes indicus taken with milk. This must be done 3-5 days consecutively. Must take tender coconut water every day.

Food as Medicine and Medicine as Food

In our Sidha systems of medicines there is nothing as medicine as such. The proverb is Food is medicine and Medicine is food. Most of the cereals that are traditionally cultivated and pulses that are grown in combination with these cereals are combined and Processed and consumed as normal diet in the daily life. Similarly some preparations are made out of the green leaf vegetables that are grown in the field or gathered from the wild are taken as food which at the same time cleanses the body from many toxic effect and serves as rejuvenative food. Such preparations are explained below.

1. Making Rasam or Pepper water
   With 300 ml of boiling water add a little amount of Tamarind or tomatoes in which a few cloves of garlic, a few cloves of pepper and a tsp of jeera are slightly pounded and put. When white foam appears, it is removed from the fire.
2. Chutney or Thuvayal
   With a few herbs, for example Sloanum trilobatum, Cissus, Coriander leaves, Mint leaves, a piece ofTamarind, 1-2 fresh or dried chillies, a handful of fried black gram and a little of salt for taste. Altogether is ground to a rough paste. This is chutney or Thuvayal. This could be seasoned in oil with mustard seeds. This could be eaten with cooked rice or idli or dosas.
3. Hot drinks
   With 1 or 2 tumblers, a few herbs like ginger, flowers of Cassia auriculata, Hibiscus and lotus or leaves of Tulasi are added. A piece of jaggery is added and boiled. A light hot drink could be made.

4. Making soup
   Required herbs like leaves of Sesbania grandiflora or Solanum nigrum and green gram, 1 tsp of jeera, a tsp of pepper, 1 or 2 Tomatoes, onions ponunded are boiled together with 2 tumblers of water. After boiling ½ tumbler of coconut milk is added.
5. Making Vatral
   Dried fruits of Solanum suratense, Solanum nigrum, Solanum trilobatum are soaked overnight in thick butter milk and removed out of it and dried during the day.Repeat the process till both buttermilk and fruits are dried. This is fried in oil and taken with cooked rice.
6. Frying
   A few greens or herbs like leaves Sesbania grandiflora, Solanum nigrum washed and cut into small piece. Seasoned with mustard and blackgram seeds. The green leaves are put in tawa and fried till cooked, splashing some water when needed. After frying, salt for taste and scrapings are added. This is eaten with cooked rice.
7. Kootu a combination
   Greens like Solanum nigrum and Moringa are cut into small pieces. Seasoning is done, greens are added. A little of cooked dhal is added. Mixed together, coconut scrapes and salt to taste are added. This is also eaten with cooked rice.
8. Sambar
   The main constituent is cooked dhal. Usually sambar is made with a few vegetables. Herbs like Solanum nigrum, Sakkaravarthi greens alsocould be made the same way.
9. Sour curry:
   Usually vegetables are made into such curries. Dried fruits of Solanum nigrum, Solanum suratense and Solanum trilobatum are made in the same way.
10. Podi
    Some herbs like curry leaves are dried and powdered together with a few dry chillies and black gram.
11. Adai
    Adai preparation with dhal is common in Tamil nadu. Herbs like leaves of Erythrina indica, Solanum trilobatum, a handful of them is ground into a coarse paste togetherwith a ½ tumbler of soaked rice. This is made into small round flat pieces and roasted over fire on a flat dosaikal with oil.
12. Dosai
    It is a common tiffin in Tamil nadu. Usually ¾ of rice and ¼ of black gram, some fresh herbs like Portulaca oleraceae, Candiaspermum, Helicacabum, Moringa leaves etc. are ground into a fine paste. Mixed with salt to taste and let to ferment overnight
13. Vadai
    Vadai is also one of the common preparations with dhals. Some herbs like leaves of coriander, mint, Portulaca oleraceae and Arai keerai, ginger, pepper and onions. It is fried in oil.
14. Masiyal
    Some tubers like Karunai or greens like Amaranthus is boied well with 1 or 2 tomatoes or Tamarind and garlic. It is well smashed and then seasoned with mustard seeds and black gram.
15. Pachadi

It is a kind of salad with curds. Small or big Onions, Carrot, Cucumber, Coriander, mint and Curry leaves are cut into small pieces and mixed well with curds and salt is added to taste.

Trainings in Organic farming:

Since October 2003 trainings were given to farmers' group in villages. A special manual "Medicinal Plants for Crop Protection" was prepared in order to help the farmers to identify the pest that attack the crops and to able to prepare appropriate herbal preparations and Panchakavya which is a growth promoter and pest preventor.

Organic Farming is our Original Farming System

Our ancestors had the practice of well planned organic farming. By experience they had their own knowledge of cropping pattern, soil fertility maintenance and medicinal plants for crop protection. They maintained a rich general biodiversity and crop diversity. They didn't exploit the under ground water. They followed particular season for various agricultural operations. They were careful about choice of crops for particular lands. Mostly rain fed crops were chosen which were paddy and other minor millets and some grams like Green gram and Black gram. Agriculture which was part and parcel of their culture has been recently changes to Agro-business. So, now we are left with,

- Green Desert.
- Polluted Environment
- Food products poisoned, less taste and less nutritious
- More pests that attack the crops

Some of the crop pests and the plant extracts used against them

Crop Pests	Extracts Used
Green Leaf Hopper Aphids White flies Leaf miner Mealy bug Earhead bug Fruitfly Cucumber beetle Scale insects Brown Plant Hopper	Neem Seed Kernel Extract Tobacco Leaf Extract Oil cake Extract
Army worm Fruit borer Stem borer Shoot borer Leaf folder Caterpillars	Neem Seed Kernel Extract Garlic, Ginger and Green Chilli Extract Jatropha leaf Extract Oil cake Extract
Root Feeders Root borer Root knot Nematode Wilt Disease Scale insects	Soil application of neem oil cake @60-100 kg/acre

Plant Products and Herbal Extract Preparations

Neem Seed Kernel Extract:

Neem Seed Kernel – 3-5 kg/acre
Water - 6-10 litres
Khadi soap solution- 100 ml/tank
Spray liquid - 500-1000 ml/tank

Preparation: Take approximately 3-5 kg of powdered neem seed kernel in a cloth bag. Soak them in 10 litres of water overnight. Next day morning filter the extract and used for spraying. Addition of emulsifier (soap solution) will enhance the adhesion of the spray liquid on the leaf surface.

Neem Oil cake Extract

Neem Oilcake – 10 kg/acre
Water - 20 litres
Khadi soap solution – 100 ml/tank
Spray liquid – 500-1000 ml/tank

Preparation: Take 10 kg of oilcake in a cloth bag and soak it in 20 l of water overnight. Next day morning filter the extract by squeezing the cloth thoroughly. Add soap solution to the filtrate before spraying.

Pungam Leaf Extract

For 5 litres of water I kg of pungam leaves are requires. The leaves are soaked in water overnight. Next day the leaves are ground and the extract is filtered. To this filtrate soap solution is added before spraying.

Pungam Seed Extract

For a litre of water 50 g of seeds are requires. Seed coats are removed and powdered. The powdered seeds are taken in a cloth bag and soak it in water overnight. The filtrate along with soap solution is used for spraying.

Garlic, Ginger and Chilli Extract

Garlic 1 kg
Ginger ½ kg
Green chilli ½ kg
Water 7 litres

Preparation: Soak 1kg of garlic in 100 ml of Kerosene overnight. To this add 500 ml of water, grind to get an extract. Take ginger and green chilli half the quantity of garlic. Grind them separately and prepare the extract with 250 ml of water each. Mix all these extract and used for spraying.

Notchi Leaf Extract

Soak 2 kg of notchi leaves in 5 litres of water overnight. Then boil them for 30 minutes. Allow them to cool and filter the extract. Add soap solution to the filtrate and then spray.

Panchakavya

Ingerdients used:

Fresh cow dung – 500 ml; Cow urine – 300 ml; Milk – 200 ml; Curd – 200 ml; Ghee – 100 ml; jaggery solution – 300 ml; Tender coconut water – 300 ml; Banana -2 nos; Yeast – 5 g.

Preparation: Mix fresh cow dung and ghee in a wide mouthed pot. Take another pot and add cow urine, milk, curd, jaggery solution, tender coconut water, banana and yeast. Keep the container in the shade. Stirr the contents twice a day, both in the morning and evening. After 3 days the contents from both the pots are put together in one pot. Keep stirring the contents twice a day for up to 10 days. On 11th day filter the content which is used for spraying. The filtrate should be diluted @300 ml/10 l of water. Store the concentrated solution for further use.

<u>Medicinal Plant Based livelihood</u>

Modern Agriculture because of its high intensive input is becoming more and more uneconomical. Besides because of the unpredictable nature of rain the agriculture becomes a gamble. Loss of biodiversity in the farming system also is a cause for rural poverty. To solve this problem we have resort to the traditional practice of enriching the biodiversity especially integrating the medicinal plant diversity along with the agricultural crop diversity.

Above part of this paper dealt with the way in the rural area herbs are grown at home for family primary health needs and also for the local community. To make medicinal plants the livelihood option for the rural poor, we will have to train people in the sustainable collection of medicinal plants from the wild and also to cultivate the most needed plants in the farms themselves. To large extent monoculture should be avoided. Rather than cultivating we can use the term grow which means introducing the medicinal plants in farming system by following the principle of Plant Sociology or it may also be called Plant Association similating the natural occurrence in the forest.

Intervention of IIRD for Alternative Marketing since August 2003

In 1996 PAF made an attempt to link the consumers with the organic farmers and to bring them to a common platform. Since the farmers are not producing assured organic food, we could not succeed in this attempt.

Since August 2003 Dr. Daniel, IIRD, Aurangabad has been greatly encouraging us to pick up alternative marketing and gave us a lot of training input and required financial help.

Alternative Marketing System

Government has setup Farmers' Bazaar in Pudukkottai town. After discussion with Government marketing committee two shops have been reserved for our organic farmers for daily sales of vegetables directly. A group of our OrganicFarmers are motivated to bring the organic produce to the regular farmer's bazaar. We are also planning to start the bazaars in few selected living quarters of selected consumer groups.

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Local Standards for assessment of Organic Farms

A local committee comprises of few experienced farmers, interested consumers and a few chief functionaries of NGOs were formed. Periodical visit of local committee aims at,

1. Motivation of farmers for changing themselves to completely organic
2. Certification of farms as 'Organic'using the following standards
    - Use of traditional seeds
    - Habit of composting Farm yard manure and agricultural waste.
    - Presence of biodiversity in the farms
    - Maintenance of cattle
    - Preparation of Panchakavya regularly for repeated use
    - Regular use of Herbal preparations before pest attack

The Paradigm that is used for Marketing of Organic Product can also be used for the marketing of the medicinal plants and medicinal products. The growers or collectors of medicinal plants will have a cooperative of their own and sell to those customers who are in need of these herbs and medicines. The end users will see that the herbs collected are from clean place and also the farmers follow the organic principles in growing the medicinal plants. The herbs and the preparations made out of these herbs will be needed by the local community, Local community healers or local shops which can be easily accessed by the users. The surplus can be sold to external buyers and the foreign market.

Herein some enlightened institutions can play a major role to save the poor farmers from the exploitation by the corporate Sectors.

In short the groups sell to the members first and next to the other group members, to local shops and to the Traditional local health healers. Next through some intervention of enlightened institutions the farmers and women groups can reach out to external markets.

Through this Paradigm of Marketing Medicinal Plants can become a relevant enterprise for the livelihood options of the rural Poor.

Environmental impact and biodiversity conservation using Organic farming from organic waste from urban and agricultural sector. : Case study on issues related to urban agriculture and waste management in India .

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Abstract : The Maharashtra state in India has 325 Towns and 33 cities. There are 232 municipal councils including A ,B, and C class , and 12 municipal corporations .These local authorities are looking after the civic administration at town or city level .These towns are now facing the acute land problem for disposal of solid waste (Domestic waste, market waste and industrial waste) causing the environmental Pollution. The combined effect of this pollution is degradation in the soil , water and air quality , which ultimately affect the civic health in these areas. The farmers from the peri- urban areas are bringing their agricultural products including vegetables in the city market. This creates large amount of the solid waste from vegetables as well as animal excreta especially organic waste, which contain more percentage of moisture content. The economic instruments for reduction of solid waste cannot be successfully implemented with out pre-existing appropriate standards and effective monitoring and enforcement capacities. Although economic incentives have been viewed as alternative to the traditional approach, they can not be considered as short cuts to the solid waste management. The source reduction, source separation and producer responsibility, these three factors are critical in developing and designing ecological sanitation model for economic and optimum waste management model using composting system in towns of the Maharashtra . The municipal councils and local authorities are spending large amount of their budget on solid waste management system, which is major constraint in expanding other civic services to citizens. This research study deals with present scenario in environmental management using compost using the Organic waste such as night soil, animal excreta etc. and its application in agriculture and forestry from urban and rural region, past efforts to ensure the economic development of compost process from agriculture waste, kitchen waste, market waste and organic waste for sustainable environment . It also discusses some of recent successful examples in regards to public - private and peoples partnership in infrastructure provision for bio-treatment and marketing for the same. The case study emphasizes for extensive capacity building for sustainable environment using compost process through public participation and its application for sustainability at local level for economic use of land in urban region..

INTRODUCTION

URBAN WASTE PROBLEM BETWEEN INDUSTRIALISED AND DEVELOPING COUNTRIES .

Developing countries often have -

- Low labour costs and extreme shortage of capital
- A waste stream dominated by organic waste , which means that (a) incineration is difficult unless undertaken in conjunction with a programme that achieves source separation of organics , and (b) composting is specially important if large amount of waste are to be diverted from landfills .
- A complex informal sector that is responsible and very active in the collection , separation and recycling of waste
- Significant mixing of industrial hazardous wastes with solid waste .
- Few people who are adequately trained in solid waste management activities
- High proportion of urban population with low level of education
- Inadequate physical infrastructure in urban areas , which makes collection of waste particularly difficult.

At the same time it should be recognized that there are also similarities between industrialised and developing countries with regard to solid waste issues. In neither case does the public want solid waste management facilities near residential areas and in both the cases the amount of the waste being generated is increasing . Adopting an integrated approach to waste management is important for both the situations.

PATTERNS OF MUNICIPAL REFUSE QUANTITIES AND CHARACTERISTICS

TABLE 1 - CHARACTERISTICS OF WASTE

PARAMETERS	LOW INCOME COUNTRIES	INDUSTRIALISED COUNTRIES
Waste generation (kg / cap / day)	0.4 - 0.6	0.7 - 1.8
Waste densities (kg/cu.m)	250 - 500	100 - 170
Moisture content (%wet weight basis)	40 - 80	20 - 30
composition (% by wet weight)		
Paper	1- 10	15 - 40
Glass	1 - 10	4 - 10
Metal Plastics	1 - 5 1 - 5	3 - 15 2 - 10
Rubber, Leather	1 - 5	- --
Wood / bones / straw	1 - 5	---
Textile	1 - 5	2 - 10
Vegetable	40 - 85	20 - 50

TABLE 2 URBAN REFUSE GENERATION RATE

CITY OR COUNTRY	WASTE GENERATION RATE kg / capita / day
Industrialised country	
New York , U.S.A.	1.80
Hamburg , Germany	0.85
Rome , Italy	0.69
Middle Income Countries	
Singapore	0.87
Hong Kong	0.85
Tunis, Tunisia	0.56
Medellin, Columbia	0.54
Kano, Nigeria	0.46
Manila, Philippines	0.50
Cairo , Egypt	0.50
Low Income Countries	
Jakarta ,Indonesia	0.60
Surabaya, Indonesia	0.52
Bandung, Indonesia	0.55
Lahore , Pakistan	0.60
Karachi, Pakistan	0.50
Bombay, India	0.50
Calcutta, India	0.52
Kanpur, India	0.51

There is no valid way of extrapolating the data in the table to get a range of values for small cities. In the U.S.A. , the country - wide average for municipal refuse generation is 1.4 kg/capita/day ; while in India , it is 0.37 kg / capita / day.

For purpose of calculation , the following municipal refuse for generation rates are suggested as a model values given in table 3

TABLE 3 GENERATION RATES FOR MUNICIPAL REFUSE

Residential refuse	0.3 to 0.6	kg / capita /day
Commercial refuse	0.1 to 0.2	kg / capita /day
Street sweeping	0.05 to 0.2	kg / capita /day
Institutional refuse	0.05 to 0.2	kg / capita /day

If industrial solid waste is includes in municipal refuse for collection and / or transfer and disposal purpose , from 0.1 to 1.0 kg / cap / day may be added at appropriate step where the municipality must estimate service delivery requirements.

WASTE CHARACTERISTICS

The waste characteristics includes -
(i) Waste density ,
(ii) Waste composition ,
(iii) Waste moisture,
(iv)Size distribution .

The first item is particularly important to the planner. Waste density information when coupled with waste generation rates expressed by weight, allow the payload capacity of the collection equipment to be estimated. When this payload capacity is then divided by the number of trips feasible for various regions of the city, it is possible to estimate the number of vehicles required to be on the collection routes each day.

The following table shows the values of waste densities for the industrialised, middle income and low income countries

TABLE 4 URBAN REFUSE DENSITIES

COUNTRY	WASTE DENSITY (kg / cu.m.)
Industrialised countries	
United States	100
United Kingdom	150
Middle income Countries	
Singapore	175
Tunisia	175
Nigeria	250
Egypt	330
Low Income Countries	
Thailand	250
Indonesia	250
Pakistan	500
India	500

The table 5 shows extent to which component data on waste composition could be obtained for this effort . Compositional differences are accountable to economic , cultural , climatic and geographic differences among cities .

TABLE 5 URBAN REFUSE COMPOSITION DATA

Type of material	New York	U.K.	Italy	Singa pore	Hong Kong	Indone-sia	Pakistan	India
Paper	35	37	18	43	32	2	4	3
Glass	9	8	4	1	10	1	3	8
Metal	13	8	3	3	2	4	4	1
Plastics	10	2	4	6	6	3	2	1
Leather,rubber	-	-	-	-	-	-	7	-
Textile	4	2	-	9	10	1	5	4
Wood, bones, straw	4	-	-	-	-	4	2	5
Non food TOTAL	74	57	29	63	60	15	27	22
Vegetable	22	28	50	5	9	82	49	36
Miscellaneous	4	15	21	32	31	3	24	42
Compostable TOTAL	26	38	71	37	40	85	73	78

MOISTURE CONTENT -

Moisture content is often not reported for the compositional samples taken .Not only is the moisture content for the total refuse mix not provided , but there is virtually no information on the moisture content of the various components of the total waste mix .Because moisture content for each components of refuse differ greatly , as shown above , compositional percentages on a dry weight basis would be quite different from those on a wet basis . Unless adjustment is made to the dry weight basis or to some common moisture level , the results are not truly comparable. It is interesting to note that the food component in the above table comprises only about 18 % of the total refuse composition but has a moisture content of about 70 % . Wastes from urban areas in developing countries have a much higher percentage of food waste in their overall refuse mix . The data provided below in table 6 demonstrates that they apparently have a correspondingly higher moisture content . It is also apparent from the data that the moisture content of refuse in developing countries is somewhat dependent on the climatic conditions.

TABLE 6 MOISTURE CONTENTS IN MUNICIPAL REFUSE

City or Country	Moisture Content %	Vegetable Content %
Industrialises Countries		
U.S.A.	22	22
Middle Income Countries		
Singapore	40	5
Nigeria	45	-
Philippines	60	43
Low Income Countries		
Indonesia	80	75
Pakistan	52	49
India	29	36

The compostable faction of refuse includes readily biodegradable organics and fine grained inerts , such as sand and ash.. In general , a moisture content of 50 % to 60 % is considered optimum for composting .Most of the municipal refuse from developing countries would have a viable initial moisture content for composting to take place with out the addition of water or a high moisture waste such as night soil , banana stakes etc.

In estimating the combustible fraction of refuse , the paper , plastic , textile , wood , food and yard waste materials are generally added together .Based on the information mentioned above , the combustible fraction of refuse in developing countries often ranges from 50 % to 80 % of the total refuse mix materials .

PROBLEM STATEMENT:

Urban living environment is more often gauged by the affordability level of people in availing essential environmental facilities in terms of quantity and quality . Unquestionably the most demanding of the urban challenge of poverty . Official estimates place 27.7 % of the urban population below poverty line (BPL) . The urban poverty manifests itself in different forms and it is visible in proliferation of slums with deplorable living conditions , malnutrition , high birth rate and high mortality rate , low level of literacy ,over utilization of civic facilities and increasing of social crimes.

Most of the countries of Asia region not only began with a highly rural background but even today continue to have large rural population mainly dependent on agriculture . The most populous cities of this region , China , India , Bangladesh ,

Indonesia , and Thailand are even today very substantially rural population .In India as per the census of the 1981 , approximately 24.6 % of the population was urban to that of 25.7 %today., the balance being rural . in Maharashtra state the urban population is about 39 % out of 78.9 million . Out of this , 12.5 million people livesin city of Bombay and 20 million in Bombay metropolitan region. The quantities and characteristics of solid waste vary from region to region , from city to city and from country to country . The factors that influence the quantities and composition are , average level of income , the source, the population , social behaviour,climate , industrial production and the market for materials . In most of the cities in Maharashtra State , the farmers bring their vegetable and other agricultural products with leaves and other agricultural waste material . They sell the same with leaves to make more profit . Every farmer try to make more profit out of this waste by selling it on weight basis.This increases the house hold waste and thereby collection at the communal bins or at common collection points. As economic prosperity increases the amount of solid waste generated is also increases in weight and volume .Some times the organic content such as kitchen waste , vegetable market waste , agricultural waste etc. and street sweeping is very high resulting the low and poor services and inefficient operations in solid waste disposal activities of local bodies. This will cause negative impacts on the environment and causing the bad effects on public health.Hence reduction in the organic waste is the major task before the local organisations to save the both, money and time on collection , separation , transportation and treatment of the waste . The problem statement is shown in fig.1.

Garbage is the waste generally thrown out of homes , markets,shops, offices and other commercial organisations often consists of rotten vegetables , food stuff . Apart from these it also contains paper , plastic bags, glass, wood , toxic materials like pesticides , chemicals and industrial waste . The primary responsibility of solid waste collection and management rests with local bodies in most of the developing countries. But due to the reasons discussed earlier and rapid urban growth , the local bodies have become either partially or fully inadequate.

COMPOSTING

Composting solid waste for use as a soil amendment , fertiliser , or growth medium is important in many developing countries. Asian countries in particular have a long tradition of making and using compost .In western Europe , a range of modern technologies is used to produce compost.

At the same time , composting has the distinction of being the waste management system with the largest number of failed facilities world-wide . In the cities of the developing world , most large mixed waste compost plants , have failed or operate at less than 30 % of capacity .

The problems most often cited for the failures of composting include :
a) High operation and management cost ,
b) High transportation cost ,
c) Poor quality product as a result of poor pre-sorting , specially of glass and plastic ,

d) Poor knowledge of the composting process ,
e) Tough competition from chemical fertilisers .

In many urban places , collection systems are too unreliable for urban authorities to consider running composting facilities efficiently.

CAUSES OF FAILURES IN COMPOST SYSTEMS:

It is believed that compost systems have failed for economic and technical reasons . What these failures have in common is a failure to understand the role of the composting as part of an overall waste management systems.

ECONOMIC FAILURES :

Many compost plants have failed for economic reasons , related either to the ability to secure waste or to the need of the market the compost that is produced.The " failure to secure enough waste is most common reason . When dumping or landfilling is inexpensive and not subject to effective environmental controls , composting is relatively expensive . .Marketing failure is another second economic failure . The compost product can become , but is not automatically , a valuable commodity : its value depends on the external demand for the soil enhances , on perceptions of its value , on its quality and its accessibility to potential users.

TECHNICAL FAILURES :

Composting has experienced the two kind of technical failures
a) Failure of the mechanical systems that manipulate waste stream before composting itself begin ,
b) Failure of decomposition process itself

The technological failure of composting is primarily a failure of mechanical pre-processing systems , and not a biological composting process itself .Biowaste composting facilities have generally relied on the complex mechanical pre-processing to move noncompostable.The small scale biowaste composting facilities are successful in Maharashtra because of the high degree of the manual pre-processing .The large facilities dependent on mechanical separation cannot accommodate the diversity of the waste stream .

In Maharashtra state and , in many places in India , the high animal and vegetable waste content of the waste stream , combined with existing materials recovery systems , means that the mixed waste stream is sufficiently compostable to produce good compost at a small or medium scale.

ENVIRONMENTAL IMPACTS OF THE COMPOSTING :

Use of compost as a soil conditioner , a fertiliser , or a growth medium has , of course , significant environmental benefits. In addition to returning nutrients to the soil and thus permitting the reduction of artificial fertilisers , compost is that does not have to be landfilled . When it is used as daily cover at landfills , it replaces other materials that would otherwise be used for that purpose .

However , there is also negative impacts on the environment associated with making and using compost . These impacts depend both on the technical approach used and the waste composition of the input streams.

Gases released from improperly maintained compost piles are a negative effect associated with the composting process.When piles or not properly aerated , colonies of anaerobic bacteria flourish and produce methane gas . The decomposition process also releases carbon dioxide , volatile organic compounds , bacteria and fungi . The releases of the methane and carbon dioxide contributes to the problem of green house gases in the atmosphere. Poorly operated composting plants also cause unpleasant odours.

Leachate production is also common. Leachate from water runoff and condensation at compost facilities occasionally contain levels of biological oxygen demand (BOD) and affects the water source nearby.

CASE STUDY OF MAHARASHTRA STATE .

INTRODUCTION -

Uncontrolled growth of population is the most acute problem that India is facing now . Because of this rise , various other problems as living , employment , water , sanitation , waste disposal and hygiene have come forward .Maharashtra is the third largest state in India both in population and area . Historically Maharashtra falls in three regions . Western Maharashtra , Vidhrbha and Marathwada . The state is divided in to 31 districts. About 70 % of people in Maharashtra state depend on the agriculture. The total area of the Maharashtra state is 30,07,690 sq. Kms. And the population is 7,89,00,000 as per the 1991 census . There are 31 districts in the state and they are further divided in to 325 blocks in six different administrative zones. The urban population of the stste is 39 % and the other being rural . There are 29 Zilla Parishad and 297 Panchayat Samitees.Number of municipal councils are 232 including A ,B and C Class municipalities and Municipal corporations are 12 including A, B and C class municipal corporations.

PRESENT SITUATION OF FAIZPUR TOWN IN MAHARASHTRA STATE

Faizpur is the historical town in Yawal tahsil of Jalgaon district in Maharashtra state . It has population of 21,322 as per 1991 census . The town has "C" class municipality . The Chief officer is the administrative head of the municipality and the President is the statutory authority of the municipality , who is elected by the peoples representatives of the different local wards . The collector and the Divisional commissioner is the regional and divisional head and the Minister for urban development of the State Government is the controlling authority for the municipality .

About 3.00 tonne garbage and waste material is collected daily with the help of the 44 labours and it is dumped in 40 pits of size 15' x 8' x 4' which occupies about 1,52 ha. Of the land , owned by the municipality.
Daily 15 trucks load garbage is collected which is converted into 500 tonnes of compost and it is auctioned for Rupees 20,000 / - The total expenditure for this sanitation is Rupees 11,04,000 / - per year . The composting process requires the period of one year which is very long . the income and expenditure ratio is quite unbalanced . Three thousands people are living in slum surrounding the compost pits on the municipal land .

The existing situation points out certain aspects as -

1) The garbage collection and disposal system should be improved .
2) The present system is totally uneconomical and put financial burden .
3) Due to heave loss of revenue the citizens get low quality of services.
4) Large quantity of market waste is produced everyday .
5)large quantity of waste material can be collected by increasing efficiency.
6) Low quality of manure is produced due to improper and unscientific methods.
7) The system is unable to fulfil the present demand of organic manure in local area.
8) The problem of offensive odour and unhygienic conditions still prevails.
9)The present system is unable to reduce the health problems due to some limitations.

Considering all these aspects a great need arises to handle the situation on scientific basis and more efficiently so that it will minimize the problems and also fetch a good income to the municipality.

PROBLEMS-

Sanitation and hygiene are hazards the Indian towns and cities are facing . As the rural population is migrating to cities more garbage and waste material is produced . A large machinary and manpower is required for collection and disposal. . The cities in Maharashtra state are facing the problem of organic waste disposal. This organic waste is generated in the market places , some places they are located in the town centers.

CAUSES -

The farmers bring the vegetable in the market , some times in the centre of the towns , from farms with out cleaning it , in order to make more profit . The farmers are selling their vegetable on weight basis .Hence the organic waste in the market area increases and put pressure on the existing system of waste collection .

EFFECTS -

Due to the increased volume and weight , most of the waste remain uncollected and starts decaying on the spot. Due to this foul odour is spread all over the towns and cities where the solid waste collection and disposal is not efficient .This again creates certain health hazards and give rise to certain diseases. The increased volume of waste requires more labour to collect and transport it to final disposal sites. This will leads in increased expenditure on the entire waste management system.

SOLUTION-

The municipalities have to concentrate on this field and also have to spend a large amount with less outcome .To tackle this problem the simplest and economical way ahead to transform all the garbage and waste materials in to the compost and vermicompost . This will prove as a boon to these authorities as it will generate a large sum per year compared to the present years .

The composting and vermicomposting will help the local authorities to dispose the organic waste by technically sound methods without affecting the environmental qualities and preserving the nature and biodiversity . The product of the composting will generates the opportunity for revenue earning for the local authorities . In other words this will strengthen the present collection and disposal system and make it more economical and self sustained. It will also help the farmers to come out of the danger caused by excessive use of chemical fertilisers. Soil depletion has taken place on a large quantity which ultimately , leads to low yield and high production cost alongwith considerable amount of the pollution . Compost and vermicompost will be useful in keeping the cities and towns clean and there by reduce the health hazards which will increase the production efficiency.

ENVIRONMENTAL MANAGEMENT STRATEGY

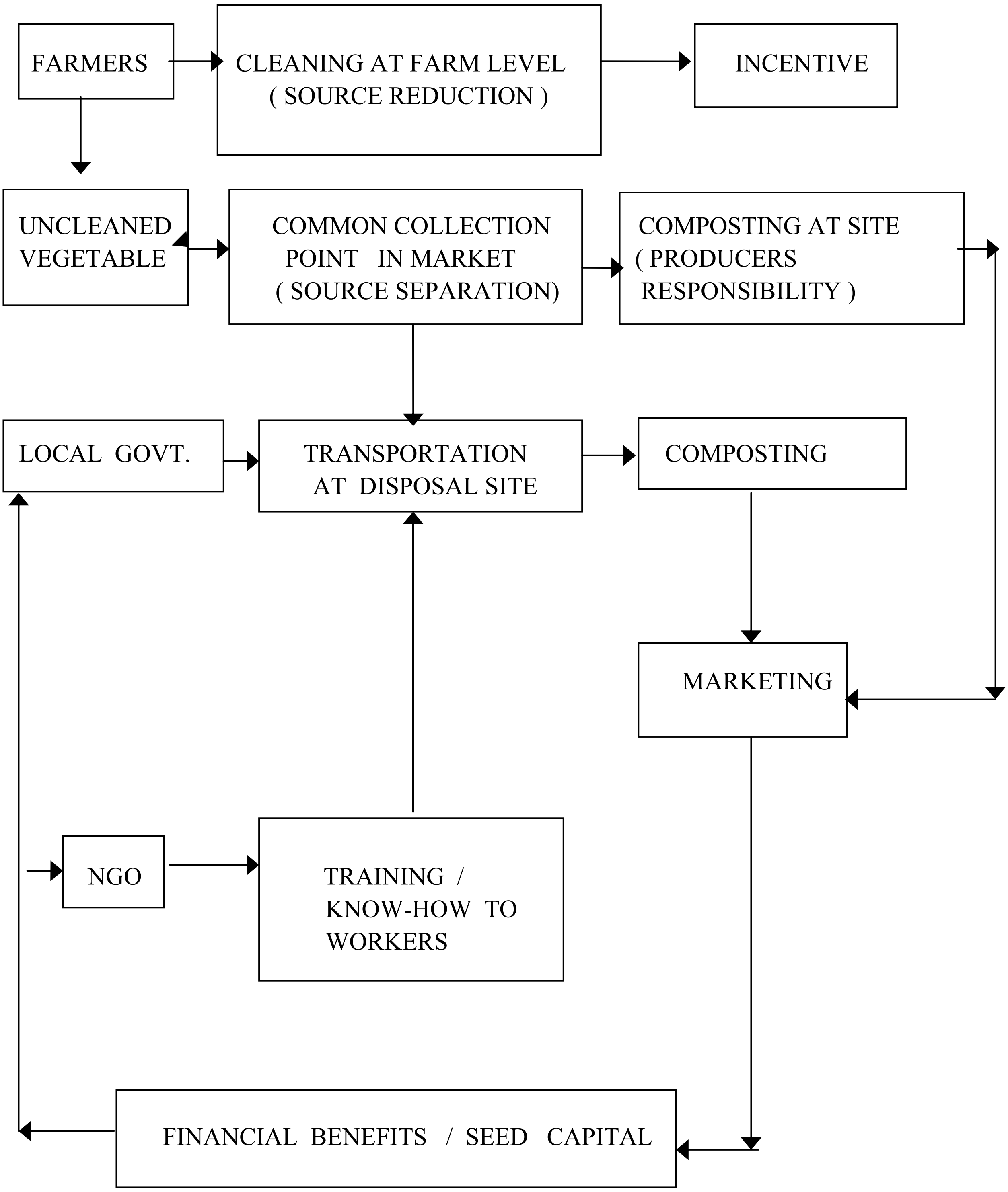

FIGURE - 1

FINANCIAL ASPECTS -

a)Cost of Construction -

Particulars	Unit cost	Total cost, Rs.
1) Construction of sorting pits - 3 Nos	1800/-	5,400/-
2)Construction of the vermicompost shade 100'x110'	120/-per sqft	13,20,000/-
3)Construction of the compost pits - 40 Nos	200/-	80,000
4)Office 15'x 10'	150/-per sqft	45,000/-
5)Storage of compost 50'x30'	150/-per sqft	35,2000/
TOTAL RUPEES		14,85,600/-

b)Cost of Machinary -

Material	Unit cost	Total Rs
1) 2" pipeline 1500 Rft for water supply	LS	45,000/-
2)2"and 1" pipe for shade - 1500 Rft	LS	20,000/-
3) Sieve for sorting garbage and compost -5 Nos.	1,000/-	5,000/-
TOTAL RUPEES		70,000/-

c)Cost of Manpower -

Post	No. Of Persons	Payment / day	Payment for Year
Supervisor	1	2500/- PM	30,000/-
Additional labour	10	30/-	1.09,500/-
Labour for vermicompost	10	30/-	1,09,500
TOTAL RUPEES			2,49,000/-

d)Training -

Particulars	No of Trainees	Cost / Trainee	Total
1) 2days Training camp at NGO	120	40/-	9,600/-
2)Conveyance for trainees	120	40/-	4,800/-
3)1 Day camp at site	120	10/-	1,200/-
4) Training material for trainees	240	25/-	6,000/-
TOTAL RUPEES			20,600/-

e)Cost of Earth warm

Particulars	Cost
Earth warms 5,00,000- @ Rs 300 per Thousands	1,50,000/-
TOTAL RUPEES	1,50,000/-

4.9 FINANCIAL ASPECTS -

a)Cost of Construction -

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e)Cost of Earth warm

Particulars	Cost
Earth warms 5,00,000- @ Rs 300 per Thousands	1,50,000/-
TOTAL RUPEES	1,50,000/-

f)Technical charges for support of NGO -

Particular	Cost
Technical consultancy charges for one year	25,000/-
TOTAL RUPEES	25,000/-

Total cost of the project -

Component	Cost Rs.
a)Cost of Construction	14,85,600/-
b)Cost of Machinary	70,000/-
c)Cost of Manpower	2,49,000/-
d)Training -	20,600/-
e)Cost of Earth warm	1,50,000/-
f)Technical charges for support of NGO	25,000/-
TOTAL COST OF THE PROJECT	20,00,000/-

BENEFITS OF THE PROJECT -

The composting and vermicomposting unit for the municipality will by all means beneficial specially economically and environmentally.The unit will compost 6 tonne of garbage and organic waste daily which will yield 2,190 tonnes per year . This will yield 730 tonnes of compost and vermicompost . The market rate for compost and vermicompost is RS 2,000/- per tonne. The earth warms are very rapidly multiplying creatures .The municipality can sell the worms at the rate of RS 300/- per thousand . In each year the expected production of the earthworm will be 5,00,000 (Estimated)

Benefit Analysis for one year

Items for sell from project	Cost per unit	Net Income
1) Compost vermicompost , 730 tonne	2,000/- per tonne	14,60,000/-
2)Earthworms - 5,00,000	300/-per thousand	1,50,000/-
TOTAL BENEFIT RUPEES		16,10,000/-

It is expected that the unit will self supporting at third year and the cost invested will be recovered in only 18 months . There will be additional revenue generation for every year which will help in promoting the other development activities in the town and better services can be provided to the citizens .Other indirect benefits expected excluding this projected values are , the farmers can get the good quality of the compost and vermicompost and there by there will be increase in the agricultural production and raising the income of the farmers. The local youths which will be trained by NGO , can start their own composting / vermicomposting unit as income generation activity and more self employment opportunities can be created at local ward level.

CONCLUSION

The Maharashtra state in India have 325 Towns and 33 cities . There are 232 municipal councils including A ,B, and C class , and 12 municipal corporations .These local authorities are looking after the civic administration at town or city level .These towns are now facing the acute solid waste problem causing the environmental pollution. The combined effect of this pollution is degradation in the soil , water and air quality , which ultimately affect the civic health in these areas. The farmers from the periurban areas are bringing their agricultural products including vegetables in the city market without cleaning it properly , with a intention to make more profit . This creates large amount of the solid waste specially organic waste which contain more percentage of moisture content.

The studies in this work shop paper points to a number of considerations that should be taken in to account when planning the environmental strategies and selecting the policy instruments for solid waste disposal in towns . The economic instruments for reduction of solid waste can not be successfully implemented with out pre-existing appropriate standards and effective monitoring and enforcements capacities . Although economic incentives have been viewed by some as alternative to the traditional command and control approach , they can not be considered as short cuts to the solid waste management. The source reduction , source separation and producer responsibility , these three factors are critical in developing and designing the model for economic and optimum waste management system in the towns of the Maharashtra .

The municipal councils and local authorities are spending large amount of their budget on solid waste management system , which is major constraint in expanding other civic services to citizens .

The composting unit for organic solid waste disposal will act as a multipurpose project for these local authorities. It will help to keep the towns clean and healthy and thereby improving the appearance of towns while the others , major economic tool , increase in the revenue of local authority by marketing the compost , selling the earthworm , which will help in self-sustaining the solid waste management system , In addition to this there will be creations of self-employment opportunities for local youth through composting unit .

The primary objective of any waste management should be to minimize the amount of the waste being generated and the amount required for the disposal . This can be achieved through waste minimization strategies that includes resource recovery , source separation and reduction . This objective has been explicitly translated in environmental management strategy through implementation of the model which includes the responsibility of main actors in waste management system .

The local authorities could play a crucial role in the success of organic waste minimization programme with help of NGOs and VOs , citizens and municipal workers by mobilizing the communities in waste reduction , recycling and recovery . However the success of the local Government in waste reduction efforts would be in their best interest by reducing waste collection cost . This will help in deciding the policies for long-term planning of solid waste disposal system in towns with out affecting the quality of the environment .

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Environmental, social and economic consequences of converting to organic shrimp farming

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Abstract : Based on its production guidelines, organic aquaculture has set for itself the goals of establishing environmentally friendly production and developing a valuable and sustainable aquatic ecosystem. This paper summarizes the multidisciplinary study of one major unit undergoing transition from conventional to organic status in Lianyungang city of Jiangsu Province, China in 2001. Researchers examined the environmental impact, risk of disease, profitability and product quality of organic shrimp production compared with non-organic management. The evidence suggests that the organic system had potentially lower negative environmental impact than the conventional system. When compared with the conventional system, organic shrimp system had higher disease-resistant capacity, significantly comparable yields, and higher economic profits, and produced firmer, better taste and higher quality shrimp product. Its significance could prove vital for the sustainability of increasing shrimp farming in the world. The authors conclude that, due to high cost for organic shrimp farming, the challenge is to incorporate the value of ecosystem process into the traditional marketplace, thereby supporting organic food producers in their attempts to employ both economically and environmentally organic management practices.

Key words: Organic aquaculture; Shrimp; Environmentally friendly production; Disease; Economic benefit; Product quality

1. Introduction

Shrimp farming has undergone extraordinary expansion since 1976. Current annual production stands at around 1 million metric tones, which is equivalent to one third of total world shrimp supply (FAO, 2001). This development generates profit and income, but it also bears risks of negative environmental impacts, such as pollution, landscape modification, or biodiversity change (Neiland et al, 2001; Paez-Osuna, 2001; Kautsky et al, 2000; Senarath et al, 2001). The main input in most conventional shrimp culture systems is shrimp feed, which is partly transformed into shrimp biomass and partly released into the water as suspended organic solids or dissolved mater such as nitrogen and phosphorus, originating from surplus food, faeces and excretions via gills and kidneys. Other pollutants are residuals of drugs used to cure or prevent disease. As a consequence, an increasing number of consumers, who are critical of conventional production methods, are willing to pay premium prices to enable the farmers to reduce economical and environmental pressure on production cost (Sundrum, 2001). Organic aquaculture emerged with the aim of solving a series of environmental, safety and health problems faced by the modern conventional aquaculture. In contrast to conventional aquaculture, organic aquaculture is a relatively new concept, and standards have to be developed that take into account the rapid development of industry as well as consumers' and environmental NGOs concerns about the sector.

Standards for organic aquaculture was first developed by Naturland association, an internationally operating certifier for organic agriculture (Bergleiter, 2001). The guidelines of organic aquaculture production have been developed (e.g. KRAV, 2001; NASAA, 2001; OFDC, 2001) in order to elaborate an alternative opposite to the development in conventional production. Main aspects of criticism were the use of chemical substances, especially inorganic fertilizers and pesticides. The International Federation of Organic Agriculture Movement (IFOAM), a large umbrella organization, has also drafted organic aquaculture standards (IFOAM, 2000), and meanwhile have found application all over the world. The Food and Agricultural Organization/World Health Organization's international Codex Alimentarius Commission has finalized organic crop, livestock, processing, labeling, inspection and certification guidelines (FAO, 2001). But organic aquatic animal standards are not yet in place and still in its draft form. The organic sector in the world is booming with the largest ever wave of farm conversions underway (Willer and Yussefi, 2001) and aquaculture is also the fastest growing sector. There will likely be a niche for farmers interested in going the extra mile for organic aquaculture certification (Brister and Kapuscinski, 2000).

A fundamental principle in organic aquaculture production is to minimize its environmental impact as much as possible while developing a valuable and sustainable aquatic ecosystem. Certified "organic" products stands for a complete or "holistic" concept, covering all aspects of production from origin of stock, feed and fertilizers to choice of production site, design of holding units, stocking densities, energy consumption and processing. The main principles for organic aquaculture production (Bergleiter, 2001) are

- Absence of genetically modified organisms (brood and seed) in stocks and feed prime material.
- Strict limitation of stocking density (in regard to fish production).

- Origin of vegetables feed and fertilizer from certified organic agriculture. No artificial feed ingredients.
- Strict criteria for fishmeal sources (trimmings of fish processed for human consumption, by-catches from artisanal fishery; no dedicated fishmeal harvesting operations.); in general, decreased protein and fishmeal content of diets.
- No use of inorganic fertilizers,
- Restriction of energy consumption, e.g. regarding aeration.
- Preferences for natural medicines; no prophylactic use of antibiotics and chemotherapeutics.
- Intensive monitoring of environmental impact, protection of surrounding ecosystems and integration of natural plant communities in farm management.
- Processing according to organic principles.

Organic production is sometimes hailed as the true "sustainable agriculture" (O'Riordan and Cobb, 2001). Its advocates claim that it is alleged to produce many advantages (environmental, social and economic) associated with a change of direction of a more sustainable agricultural future. A number of comparison studies have been conducted between organic agriculture and conventional (e.g. Haas et al., 2001; Younie et al., 1992; Woese, 1997; Weibel et al., 1998; Sundrum, 2001; Reganold, 2001; O'Riordan et al., 2001; Kristensen et al., 1994; Feber et al., 1997; Cobb et al., 1999; Cederberg and Mattsson, 2000; Dalgaard et al., 2001). However there have been no published studies comparing the consequences of organic and conventional shrimp farming.

The objective of this paper is to give an analysis of one-year multidisciplinary field study of one shrimp farm undergoing transition from conventional to full organic status by examining a range of ecological, culture and economic factors.

2. Materials and Methods

2.1 Study area

From January to December 2001, we conducted 2 replicate shrimp farming ponds for each of the organic and conventional production systems respectively. The experiment is located in Xuwei salt field, Yellow Seaside, Lianyungang city of Jiangsu Province and was part of a 10-ha commercial shrimp farm. The pond was about 0.33 ha (110 m length × 30 m width) and 2.8 m in depth. A 1500-W aerator was fixed in the center of each pond to prevent water from stratification and to increase the concentration of dissolved oxygen to a small extent.

2.2 Farming system

The juvenile Penaeus chinensis were bought from the shrimp farm of Sea Institute of Shandong Province. Shrimp were stocked in two systems on 16 April 2001 at a same density of 7.2 individuals /m2 with the body length of 0.84±0.16 cm. Before stocking, the juvenile were acclimatized to 30‰ seawater. In cooperation with the farmers, we chose appropriate management practice for the two systems (Table 1). The two systems had the same total water nitrogen and phosphorus inputs. Disease and physical disorders were monitored throughout whole growing season by the farmers and professional consultants who recommended organic and conventional treatments for their control.

One month before the beginning of the experiment, the two systems were fertilized with fully composted chicken manure to cultivate natural food. After stocking, composted chicken manures were applied in both conventional and organic system, according to water color and secchi disc visibility to keep the optimum water color and transparency of 30-40 cm during the experiment. A commercial pellet manufactured by the local Sulanlin Fishery Feed Co. Ltd., Jiangsu, China was supplied to conventional shrimp. A formulation with wild artemia from local salt pans, organic soybean from OFDC (one organic certifier in China) certified farms and natural clam was found as the feed to organic shrimp, which is in accordance to organic requirements. Feeding behavior was the same for the two systems, two times a day from April 16 to May 15 (0600–0700 and 1800–1900 h), four times from May 16 to May 31 (0600–0700, 1000–1100, 1800–1900 and 2100–2200 h), five times a day in June and July (0600–0700, 1000–1100, 1400–1500, 1830–1930 and 2300–2400 h) and also five times a day in August and September (0600–0700, 1000–1100, 1600–1700, 1900–2000 and 2330–2430 h). There is a feeding tray that is 0.56 m2 in area set in each pond. The feeding rate changed from 7.0% to 1.0% of body weight of shrimps with the growth of shrimps. The growth of shrimps was determined by sampling of 20 individuals every 10 days and were returned to their pond after weighing. The aerators were operated twice a day 0700–0800 and 1400–1500 h on sunny days before June, three times a day in July and August 0500–0600,1400–1500 and 2100–2200 h, and on cloudy or rainy days over the whole course of the experiment. The water in the systems was exchanged and seawater was added at the appropriate time to make up for losses due to evaporation, seepage and improve the water quality in the ponds.

2.3 Analysis

A variety of parameters were monitored (Table 2). Water quality parameters include temperature, salinity, dissolved oxygen, pH, ammonium, nitrite, nitrate and phosphate. Sampling started in April 2001 and continued during the shrimp growing season. Measurements of temperature, salinity, dissolved oxygen and pH of pond water were performed in situ during the sampling process, at a depth of 30 cm in each pond. Ammonium, nitrite, nitrate and phosphate were quantified in the laboratory. Water samples were firstly filtered by using a 0.45 μm filter (Seagull brand, produced by Hailing medicine Co., Ltd. of Zhejiang province), collected in polypropylene bottles and returned immediately to the lab for analysis by applying standard methods (National Oceanographic Bureau, 1991). Water exchanges from the two ponds normally happened at monthly intervals and varied according to the stage of the production cycle and different management systems. Discharged water quantity was recorded and water samples were monitored also. When harvesting, fresh shrimp samples (20) were collected randomly from organic and conventional shrimp farming systems. Body length, body weight and amino acid level were analyzed.

We also calculated gross receipts using farmgate prices for shrimp sold at harvest or after storage. Prices for the specific size, grade conventional and organic shrimps from our study were based on practical prices. Total costs included non-harvested variable costs (fertilizers, pesticides, feed, fuel, labour, electric power and housing), harvest variable costs (harvesting, grading, packing and storage) and fixed costs (machinery, interest and taxes) etc.
From October to December 2001, we randomly visited 15 organic shrimp consumers who were deliberately not informed about the basis of the comparison of organic shrimp and conventional in order to investigate the firmness and taste difference with the shrimp they consumed before.

3. Results

3.1. Water quality

The quality of two pond systems was evaluated by analyzing the parameters mentioned above. The results were shown as follows:

3.1.1 pH, Temperature, Salinity and Dissolved oxygen
The quality data are listed in Table 3. During the field experiment, salinity fluctuated between 13.5‰ and 19.6‰, temperature fluctuated from 19.5℃ to 29.8℃, pH from 8.4 to 8.9, and dissolved oxygen from 5.0 mg/l to 6.0 mg/l. There were no significant differences in above-mentioned parameters between conventional and organic treatments throughout the experiment.

3.1.2 Nutrients
The concentration of ammonium, nitrite, nitrate and phosphate are given in Figs 1-4, respectively. The pattern of all four nutrients shows big differences in the two production systems. With the cultivating period, the concentration of nutrients showed increasing trend both in the two systems. The pattern of nitrite, nitrate and phosphate in the conventional system was significantly higher than in the organic system, with maximum concentration found in the harvest season. But for ammonium, the concentration is higher in the organic than in the conventional system.

3.2 Increasing rate of shrimp body length

Mechanical analysis of shrimp body length throughout the growing period showed that monthly body length increasing rate for organic shrimp was higher than for conventional shrimp. The fastest growing period is from April to May 2001, with monthly growing rate of 2.9 cm and 2.6 cm for organic and conventional shrimp respectively (Fig 5).

3.3 Harvest and shrimp quality

We assessed aquacultural performance by measuring shrimp yields, body length, fresh and dry weight and amino acid content.
The harvested organic shrimp had average body length of 14 cm, and fresh body weight of 22.39 g, dry body weight of 6.1 g, which is higher than conventional shrimp with average body length of 10.6 cm and average fresh body weight of 10.1 g, dry weight of 3.0 g. The net organic shrimp yield was 3060 kg/ha, and for conventional shrimp, 1545 kg/ha. The statistical analysis indicated that the body length, body weight and yield of shrimp in organic system were significantly higher than that in the conventional system (table 4).
Amino acid contents, an indication of shrimp quality, were most often higher in organic shrimp except Ser and Pro (Table 5).
Based on the investigation on a panel of 15 consumers, we found that 80% and 100% consumers said that shrimp produced organically under carefully controlled experimental conditions did taste better and had higher firmness.

3.4 Benefits of the two treatment systems
Net economic incomes in organic and conventional systems were 6182 and 103 RMB yuan/mu (here, RMB is the abbreviation of the currency used in P.R. China, and Yuan is its monetary unit whose exchange rate to US dollar is 1:8.3 or so; mu is Chinese surface unit whose exchange rate to ha is 1:15), with the ratio of total costs to gross receipts of 1:1.76 and 1:1.08 respectively. Organic shrimp system exhibited significant economic efficiency (Table 6).

We assessed the environmental benefits of the two production systems by comparing the total discharged nitrogen and phosphorus quantity. The total discharged water quantity during the culture period was lower for the organic system than for the conventional system (Table 7). Discharged Nitrogen and Phosphorus quantity for the conventional system was 34.27 kg and 0.3747 kg respectively, 14.89 kg and 0.3418 kg more than that for the organic system respectively, making the organic system better environmental benefit.

4. Discussion

4.1 Environmentally friendly production
Adverse environmental impacts related to shrimp aquaculture have been widely reported in the literature (e.g. Primavera, 1997, 1998; Phillips, 1998; Paez-Osuna, 2001). There is a large amount of nutrients in shrimp ponds derived directly from feeding and fertilization or indirectly from primary productivity, some of which is dissolved or suspended in water, some of which is deposited at the bottom of the pond. Much of these nutrients is wasted in the middle and later culture stages of the monoculture system because it cannot be fed upon directly by shrimp (Ding et al., .1995). During the course of conventional aquatic breeding, untreated waste water laden with uneaten feed and fish faeces may contribute to nutrient pollution near surrounding water bodies (Ervik et al, 1997). Moreover, nitrogen wastes (for example, ammonia and nitrite) that

exceed the assimilative capacity of receiving waters lead to deterioration in water quality that is toxic to fish and shrimp (Hargreaves, 1998). Leaching from both uneaten feed and shrimp faeces results in significant amounts of dissolved organic nitrogen being released in the water (Burford et al., 2001).

The organic standards for shrimp farming take a responsible stand on several environmental issues. For instance, issues dealt by the standards include protection of wild stocks, creating large or physical buffer zones, the monitoring of farm effluents, recycling of shrimp heads, energy consumption and the influence of shrimp farms on traditional landscape usage. Improving the method of food supply and the nutrient composition of feed could be effective strategies for reducing the load of nutrients in the shrimp pond or into the environment. According to IFOAM Basic Standards for Organic Production and Processing, aquafeeds shall generally contain 100% certified organic components, or wild aquatic feed resources. When certified organic components or wild marine resources are not available, the certification body/standardizing organization may allow a maximum 5% of the feed (by dry weight) to be of conventional origin (IFOAM, 2000). The efforts to organic farm shrimp are more in tune with local ecosystem processes and functions, e.g. by creating large or physical buffer zones that prevent spreading of disease and provide ecological services, and adapt the farming to the local carrying capacity (Troell et al., 1997, 1999).

From the results of the present study, the ammonium, nitrite, nitrate and phosphate concentration levels tended to increase with the growing time. This may be contributed to the accumulation of ammonium, nitrite, nitrate and phosphate in wastes, as feeding rates increased throughout the season. Nitrite, nitrate and phosphate levels in the conventional system were significantly higher than in the organic system, with maximum concentration found in the harvest season. Studies on nitrogen and phosphorus budget of the organic system indicate that the aquaculture effluent to coastal waters was less than 77% and 1039% of that caused by the conventional system. These results demonstrate that organic shrimp make better use of input materials and can effectively reduce the loading of organic matter in the water inside and outside the ponds. This effect can be explained by the following opinions.

The main specifications concerning environmentally friendly production in organic shrimp farming have to do with the renunciation of pesticides and mineral nitrogen, with the handicap to minimize the amount of bought-in conventional feed. Without these substitutes, organic farming must rely on efficient nutrient circulation within the farm to maintaining high production. Reduction of pollution or energy consumption is reached by a systemic and causally related approach, while conventional strategies are often more based on technical and management related measures. In this study, the range of animals use different types of food resources and carry out different management practices (Table 1). The nutrient quality and composition of feed are likely to have a significant impact on nitrogen and phosphorus leachates. Organic shrimp feed on a mixture of certified organic soybean, artemia and clam in the farm. In the conventional system, an artificial diet was inputted. Artemia is one of the best live foods for and can be digested fully by shrimp. Its protein conversion rate amounts to about 80%, significantly more than fishmeal (Li, 1983; Zeng et al, 1998). Produced soybean has a low phosphorus level (Che, 1998), which can causes low phosphorus leaching if used as feed of aquatic animals. There is little evidence for a system-related effect on the results of organic aquaculture production due to the use of organic aquafeed in the organic shrimp system. But in contrast to conventional produce, organically produced product should be environmental-safe and healthier, and the risk of produce grown organically being contaminated with pesticide residues is much smaller than with conventionally produced crop (Schupbach, 1986).

However, based on the results of this study, the organic system has its own problems. Ammonium level is higher in the organic pond than in the conventional system. This may be attributed to the high NH3 excretion rate from the gills of organic shrimp. Previous studies have shown that the main source of ammonium was ammonia excreted from shrimp gills (Burford et al., 2001).

4.2 Disease

Disease is recognized as the biggest obstacle for the future of shrimp aquaculture and they indirectly have bearing on the environment (Paez-Osuna, 2001). From the little epidemiological data available, it appears that the disease is spread by movement of water or, in certain cases, movement of fish without adequate quarantine and health certification (Arthur, 1996). Taking shrimp farming as an example, viral and bacterial diseases, together with poor soil and water quality, are the main causes of shrimp mortality (Liao, 1989; Chamberlain, 1997), although deficient environmental management of shrimp farms is another important determinant (Flegel, 1996). E.g., chemical and biological pollution by farms includes disposal of pond effluents and sludge in surrounding waters; salinization of soil and water, misuse of chemicals, including antibiotics and pesticides; and introduction of exotic shrimp species and disease (Primavera et al. , 1993; Flaherty and Karnjanakesorn, 1995; Beveridge et al., 1997). The risk of disease seems to increase with intensity of farming and water quality in the pond. Disease occurrence in shrimp ponds in Hainan, China was closely associated with poor water quality (Spaargaren, 1998). Declining environmental suitability results in an increased incidence of disease with time, which ultimately may lead to failure of the shrimp pond (Chanratchakool et al., 1995).

Looking at the disease issues as an indicator of animal health, several authors found a decrease in the disease on organic compared to conventional livestock farms (Vaarst et al., 1993;Ebbesvik and Loes, 1994; Vaarst and Enevoldsen, 1994). Management of the pond environment is probably the most important factor for disease prevention in shrimp mariculture (Flegel, 1996). Conventional shrimp farming system relied on high nutrient-rich feed input. This exploitation pattern has often caused disease occurrence (Huitric, 1998).

Shrimp farming as a whole has developed a poor reputation, with ill-considered, inadequate and even dangerous management techniques, like "chemical wars" against putative disease vectors and the use of antibiotics (with all the risk of building up resistant human pathogens), being common. Maintaining organic standards should ensure such irresponsible procedures will not take place (Bergleiter, 2001). According to the results of the present study, organic management may be more helpful to reduce disease risk as compared to conventional one. As for the mechanisms, the authors are of the following opinions.

Most of the diseases appear to be multivariate responses to a complex set of interrelated causal factors and are often due to mistakes of the farmer, inadequate handling and inappropriate housing conditions (Enevoldsen and Grohn, 1996). Management-related factors, such as regular checks of the feeding machine, feed analysis and the calculation of the diet are, and prove to be importance for animal health (Schukken et al, 1990; Bartlett et al., 1992). In contrast to conventional production, the basic standards of organic aquaculture production include regulations concerning cultivating conditions, which are suited to serve as preventive measures. For example, we created physical buffer zones around organic pond to prevent spreading of disease and entering of off-farm. Adequate measures such as policies and regulations had been taken to prevent escapes and entry of species cultivated in organic pond as well as water and persons. In our organic shrimp production system,
during the growing time, only wild aquatic (organic) feed (artemia and clam from local ecosystem) and certified organic soybean was used; chemical synthetic (artificial) materials was prohibited; the discharge of waste water and sludge to the surrounding environment was restricted; and intensive monitoring system of environmental impact was set up and implemented also. However, compared conventional system relied on artificial feed and during the breeding period, Calcium oxide, Keng iodine disinfectant and bioremediation product, were used to treat pond and water, and bleaching powder for disease control.

4.3 Economic benefit

Better water quality and better feed may explain why growth rate and net yield of shrimp in the organic system were significantly higher as compared with the conventional system. We assessed the economic benefit of the two production system by calculating the net profit in this study. The organic system was significantly more profitable than the conventional system. Higher production costs for the organic system were largely due to differences in feed applications, labour, housing, electricity, operation etc. The cumulative gross receipt can vary depending on several factors, such as shrimp body length, prices, yields, shrimp taste and shrimp quality. Regarding shrimp body length, the breakeven point happened from July to August 2001 (Fig. 5). During this period, first signs of disease appeared in the conventional system. In order to reduce disease risk, the grow-out period in shrimp farming is often shortened, resulting in harvesting of smaller shrimp. Sometimes, cultivation continues until first signs of disease appear when the crop is immediately harvested and can still be marketed, but at lower quality (Thongrak et al., 1997).

4.4 Product quality

In the consumer's mind, organic produce must be better and healthier than that produced under conventional farming system. This image is also the main motive for consumers who are willing to pay premium prices for purchasing organic food (Lockie et al., 2000). Therefore, quality differences have been the subject of many recent comparisons between conventional and organic food, as reviewed by Woese et al. (1997) and Worthington (1998) (Woese et al., 1997; Worthington, 1998). However, a clear comparison between organic and conventional produced products is difficult to establish due to the great variation within the production methods, concerning among other things, intensification, feeding rate or breeds used (Sundrum, 2001).
In the aspect of product quality in this study, the organic shrimp was generally higher in some important variables (taste, firmness and amino acid level). Among the amino acids, Thr, Val, Met, Phe, Ile, Leu, Lys, Trp are the necessary for human being (Wang et al., 1997), which is higher in organic shrimp than in conventional. These indicated that organic shrimp production could lead to a higher quality of firmness and amino acid level due to better feed as the consequence of the organic management method.

5. Conclusion

Our results show that organic shrimp production system in Lianyungang city of Jiangsu Province is not only better for the environment than its conventional counterpart but have higher disease-resistant capacity, significantly comparable yields, higher economic profits and better quality. Although shrimp yield and quality are important products of a farming system, the benefit of the environment quality provided by the organic production system is equally valuable and usually overlooked in marketplace. Such external benefit come at a financial cost to farmers. It would be very interesting to compare organic and conventional shrimp approaches in a cost–benefit analysis including environmental costs and sustainability issues (environmental and economic) to see how we should optimize shrimp production. Due to high cost, culturists of organic aquatic systems may be unable to maintain profitable enterprises without economic incentives, such as price premiums or subsidies for organic products. The challenge facing policymakers is to incorporate the value of ecosystem process into the traditional marketplace, thereby supporting organic food producers in their attempts to employ both economically and environmentally organic management practices.

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Table 1 Management practice for organic and conventional shrimp ponds in 2001

	Organic shrimp pond	Conventional shrimp pond
Pond preparation	Composted chicken manure (1000 kg/ha)	Composted chicken manure (1000kg/ha)
	Physical buffer zones around the organic pond	No buffer zones
Feeding	Organic soybean, Artemia and clam	Commercial pellet
Water amendment	A 1500-W aerator	A 1500-W aerator, Calcium oxide, Keng iodine disinfectant and bioremediation product
Disease control	----	Bleaching powder

Table 2 Variables studied and corresponding methodology

Variable	Monitoring Interval	Method
PH	Twice daily	pH / mV meter / electrode
Dissolved Oxygen	10 days	Oxygen meter
Salinity	10 days	Refaractometry
Temperature	Twice daily	Thermometer
Ammonium	Monthly	Nesselerization/Spectrophotometry
Nitrite	Monthly	Diazotization/Spectrophotometry
Nitrate	Monthly	Cadmium reduction/ diazotization
Phosphate	Monthly	Ammonium molybdate/ Spectrophotometry
Amino acid	When harvesting	Amino acid analyzer

Table 3 Temperature, pH, salinity and DO for organic system and conventional

Parameter	Organic system	Conventional system
pH	8.4-8.8	8.6-8.9
Salinity (‰)	13.5-19.6	13.5-19.6
Temperature(℃)	19.5-29.8	19.5-29.8
DO (mg/l)	5.0-6.0	5.0-5.8

Table 4 Mean final sizes and yield of cultured shrimp in the organic and conventional systems. The parameters were presented as mean ± standards deviation except for net yield.

	Body length (cm)	Fresh body weight (g)	Dry body weight (g)	Net yield (kg/ha)
Organic	14±0.44	22.39±3.57	6.07±0.35	3060
Conventional	10.6±0.34	10.01±0.77	2.35±0.33	1545

Table 5 Amino acid content for harvested organic and conventional shrimp

Variable	Organic (g/g DW)	Conventional (g/g DW)
Asp	0.091	0.064
Glu	0.116	0.055
Ser	0.031	0.032
His	0.013	0.009
Gly	0.074	0.060
Thr*	0.028	0.025
Arg	0.073	0.062
Ala	0.048	0.046
Tyr	0.024	0.021
Cys-cys	0.090	0.070
Val*	0.038	0.037
Met*	0.023	0.022
Phe*	0.028	0.026
Ile*	0.034	0.033
Leu*	0.058	0.055
Lys*	0.051	0.050
Pro	0.125	0.159
Trp*	0.012	0.009

*: necessary amino acid for human being.

Table 6 Economic benefits for organic and conventional shrimp systems (unit: RMB yuan). The costs and income were calculated by market price in 2001.

Treatments	Costs						Benefits		Total costs vs. Gross receipt
	Seeds	Labour	Feed	Electricity	Housing	Others	Shrimp	Net incomes	
Organic	4000	8000	10920	5969	5000	2600	71400	30911	1:1.76
Conventional	4000	1000	1100	2468	0	200	9283	515	1:1.08

Table 7 discharged water for the two production systems and correspondent nitrogen and phosphorus quantity

(Nitrogen=NH_4^++NO_3^-+NO_2^-; Phosphorus = Phosphate)

Parameter	Discharged water (m^3)		Nitrogen concentration of pond water (mg/l)		Phosphorus concentration of pond water (mg/l)		Nitrogen quantity in the discharged water (kg)		Phosphorus quantity in the discharged water	
	Organic	Convent-ional	Organic	Convent-ional	Organ-ic	Convent-ional	Organic	Convention-al	Organic	Convent-ional
April	0	400	0.365	0.114	0	0	0	0.046	0	0
May	0	600	0.616	0.456	0	0	0	0.274	0	0
June	0	767	0.802	1.364	0	0.018	0	1.046	0	0.0138
July	800	834	0.906	2.456	0.001	0.029	0.725	2.048	0.0008	0.0242
August	1200	934	1.369	3.043	0.003	0.034	1.643	2.842	0.0036	0.0318
September	400	---	1.741	----	0.002	----	0.694	----	0.0008	----
Post-harvest	9240	9240	1.767	3.031	0.003	0.033	16.32	28.01	0.0277	0.3049
Total	11640	12644	---	---	---	---	19.38	34.27	0.0329	0.3747

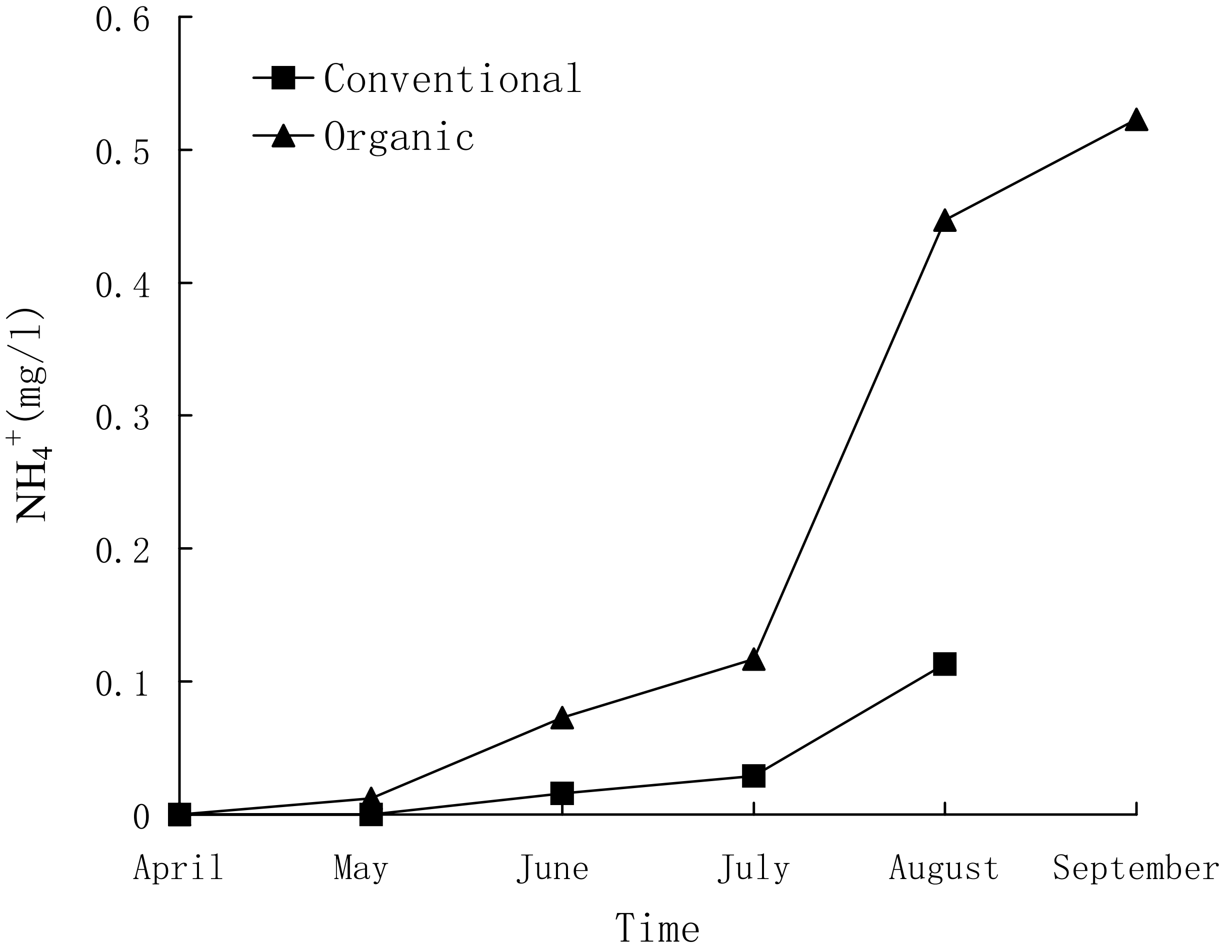

Fig. 1 Monthly patterns of NH_4^+ in the organic and conventinal systems, April to September 2001

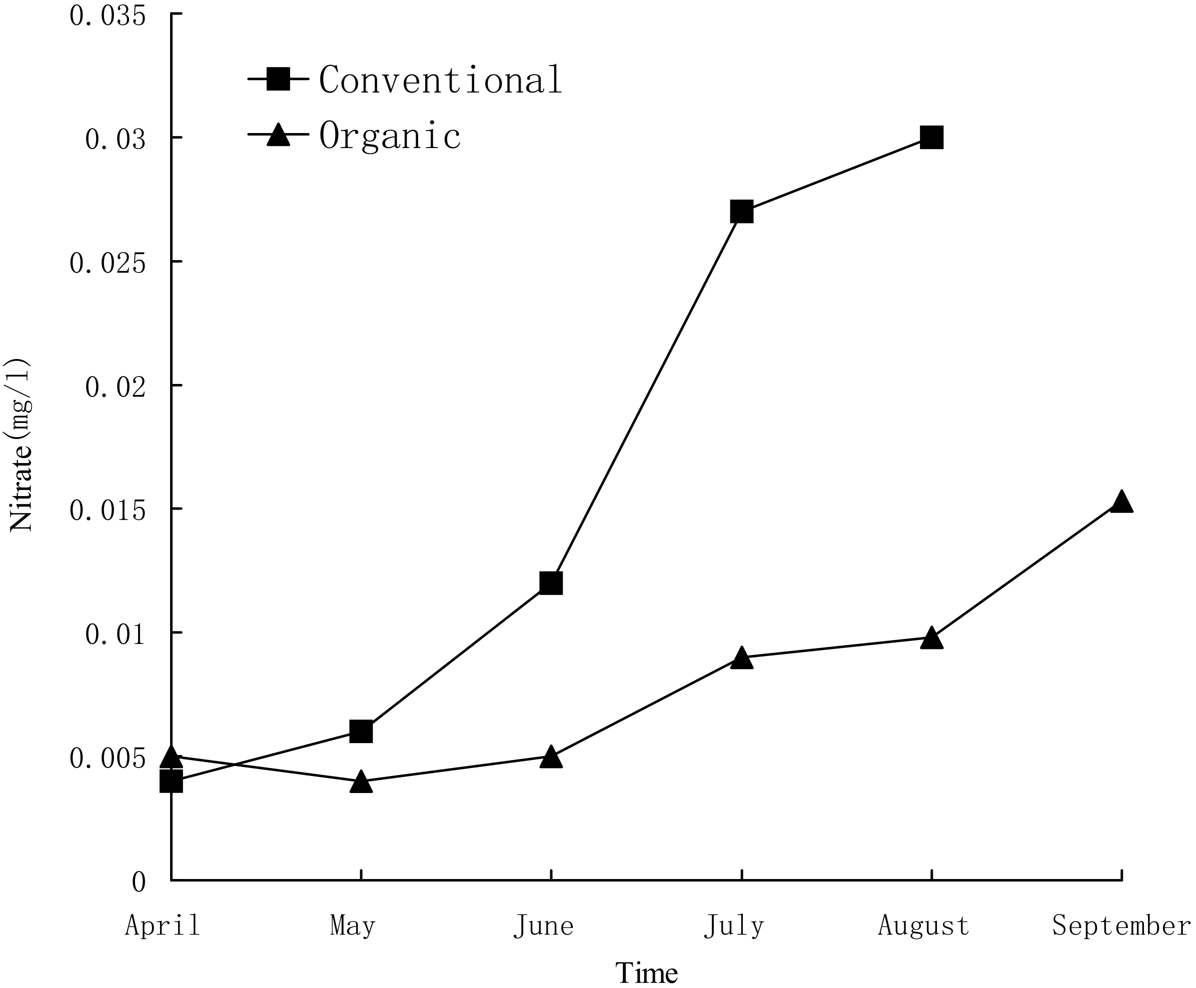

Fig.2 Monthly patterns of Nitrite in the organic and conventional systems, April to Sepetmber 2001

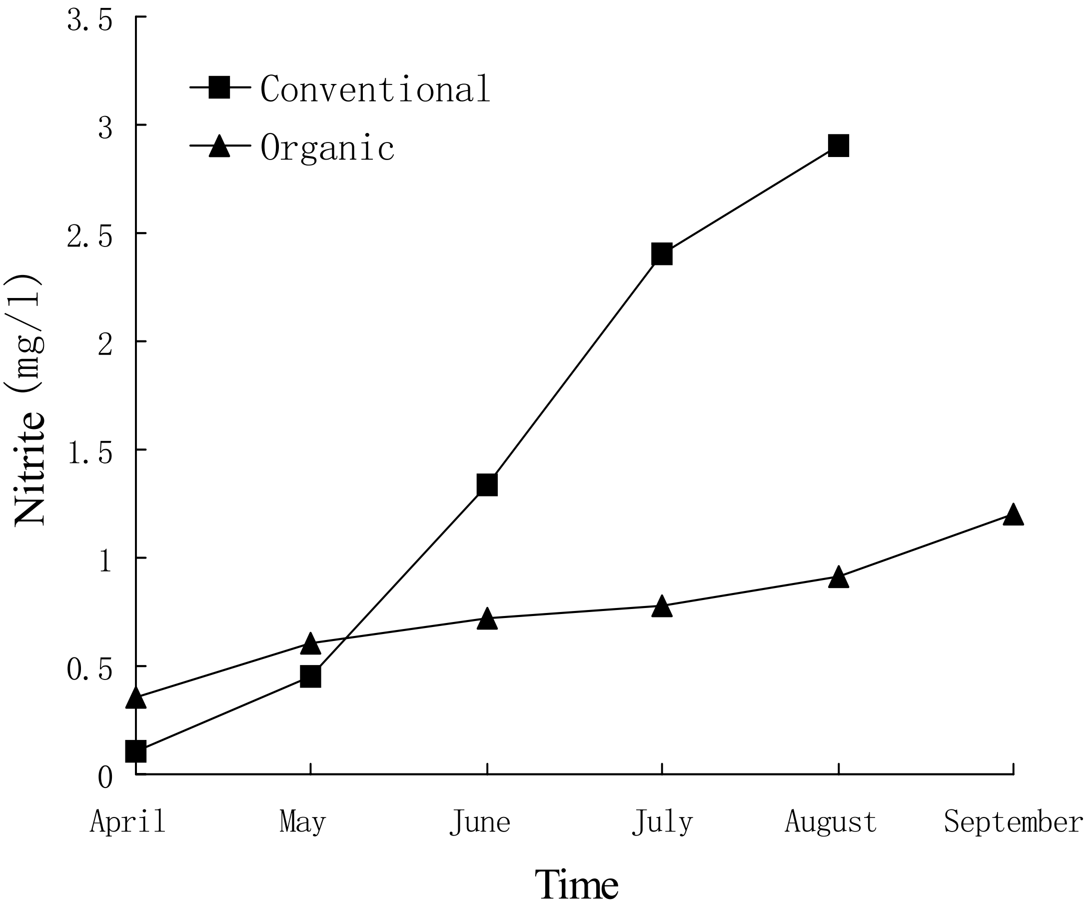

Fig.3 Monthly patterns of Nitrate in the organic and conventional systems, April to September 2001

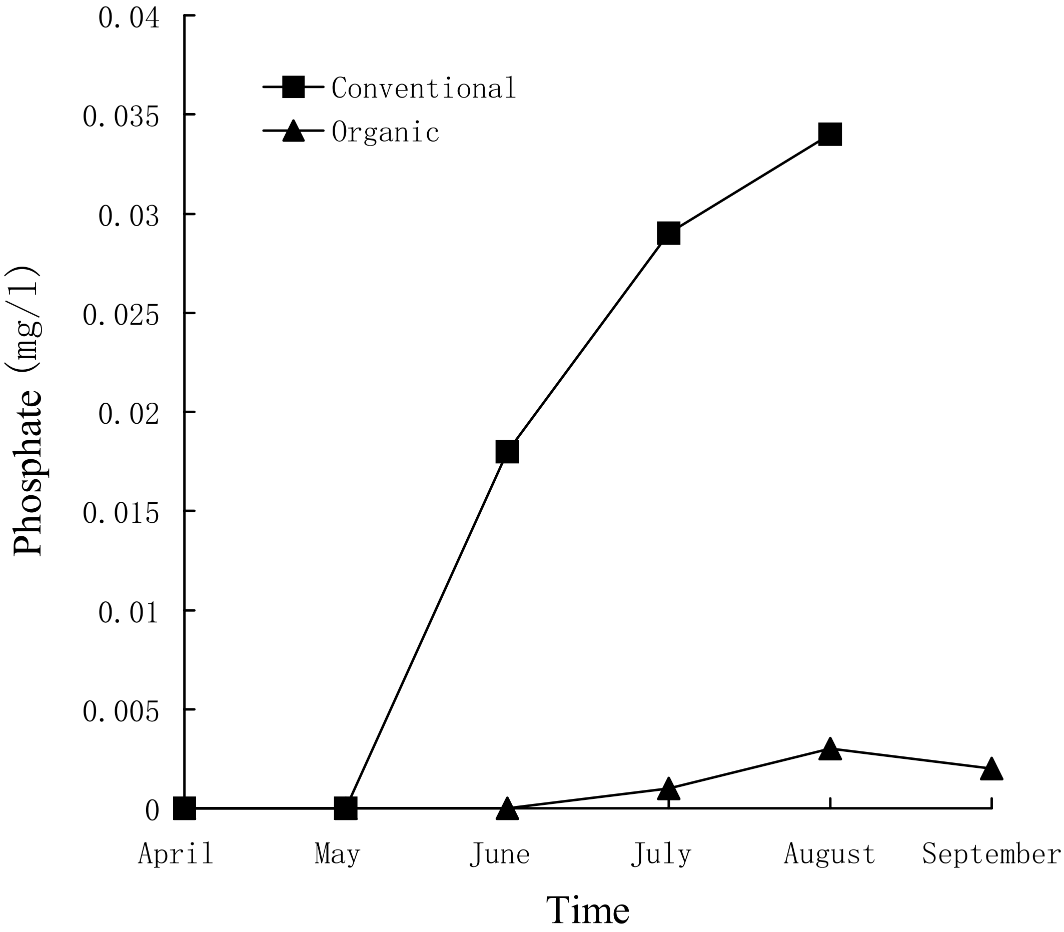

Fig. 4 Monthly patterns of Phosphate in the organic and conventional systems, April to September 2001

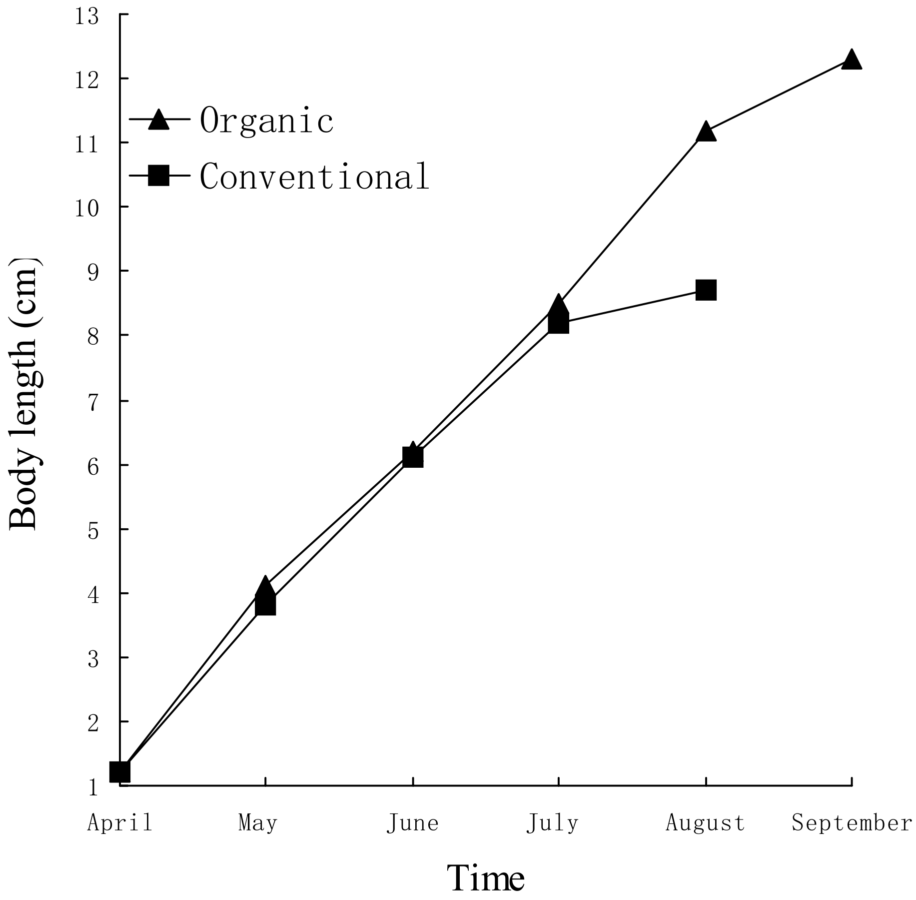

Fig.5 Monthly body length patterns in the organic and conventional systems, April to September 2001

GEOBIOLOGY IN BIOVEDIC AGRICULTURE - Technology, Food Qualities, Farmers – Consumers Link

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Abstract : The current methods of organic farming reduce the yield for initial 2-3 years which is a discouraging factor for many marginal farmers of poor Asian countries. For the organic movement to be successful, it is essential that the mass population of the farmers is given the appropriate developed technology that would not bring about any downfall in the yield, even in the first season of conversion and the farmer is not subjected to any economic losses in comparison to the conventional methods. The BIOVEDIC method is the combine sciences of advanced Biological, Biodynamic and Vedic methods, an effort to increase the quantitative and qualitative yield from the very first season of conversion, so essential for the economics of the converting farmers. In Organic Farming, we normally cover the qualitative aspects relating to the Nutrition, Health, Taste, Shelf-life, Pest and Disease resistance, etc. This paper discusses certain *UNCOMMON factors like:*
Energy in food, providing energy to its consumers and measured by the GEOBIOLOGY instrument, the 'H3 Lecher Antenna';
how Bio-Vedic food influence the Thinking quality and power;
development of the Spirit;
improving the quality of Life Force " the Aura";
the practical applications and experience of application of the advance sciences of Biodynamic and Vedic Agriculture techniques with special reference to the Electro-magnetic Energy Lines (Geomancy or Geobiology) in Agriculture and
Successful effort in organizing groups of Biovedic Farmers and Biovedic Consumers in India

INTRODUCTION

It was my pleasure to present two most informative papers* during the 4th Ifoam-Asia Conference held at Philippines and published in the Proceedings of the Ifoam-Asia Scientific Conference in 1999. This paper is my effort to present further experiences of the farmers on various crops in different parts of India, under my consultation. Interesting additions are:
1) The incorporation of the science of 'Geomancy or Geobiology'
2) The Marketing of Bio-Vedic Food by linking the Bio-Vedic Farmer's Group and the Bio-Vedic Consumer's group in Pune, India.

Before proceeding, I would like to remind to the august gathering that the **Bio-Vedic System of Agriculture**, designed by me, is an effort to **combine all the goods** from the various alternative methods of **Biological, Bio-Dynamic** and ancient Indian **Vedic Agriculture.** It is most important that if we want the Organic movement to gain momentum, we must develop package of practices that would increase the profitability of the farmers, right from the first season of conversion. Practically speaking, the farmer is into the business of agriculture for making money therefore, the scientific knowledge must prevail to take care that his yield does not decline, even in the initial two years, as is normally experienced by the organic farmers. Most of the marginal farmers are reluctant to even bear this loss. Due to small holdings, they even refuse to experiment in a small scale! The farmer knows very well the degenerating and toxic effects of the chemicals and poisons being used by him but, he requires a suitable alternative. No farmer will be willing to use chemicals and poisons provided; the alternative method is not putting him to any losses when compared with the conventional system. There is no point of inspiring him by telling him the damage he is causing to the environment by using the conventional abusive inputs or his social responsibilities towards maintaining an ecological balance. His primary concern is to fill his stomach. Give him the appropriate technological and quality enriched biological inputs; he will be most reluctant to use the poisonous chemicals.

We know that, the more chemical fertilizers we use, the more the soil becomes mineralized rendering the nutrients unavailable. The more the soil toxins increases, the life force in the soil declines, making it less sensitive to make use of the subtle Formative Forces from the Cosmos. The more Plant Protection Chemicals we use, the more we poison our soil and the food and create more immune pest and disease organisms. We call people promoting NPK as people with Tunnel minded. I feel people who promote Organic Farming (as is mostly understood) are equally tunnel minded with the only difference being that, the "diameter of their tunnel has increased"! In order to understand the NATURE thoroughly and all the sciences behind producing quantity and quality, we must break all the tunnel walls and expose our mind set to "COMPLETE OPENESS" so that, there exists no tunnel. That is how the Nature and Universe is, linking ALL, without any tunnel. Besides, we must go beyond the quality of the food, in terms of its taste, nutrition content and shelf-life. There is more to be added to that, the ENERGY the food has and provides; the LIFE force and, the quality of SPIRIT. The last three are most important to give us better strength, better quality life and better thinking power. In Ayurvedic system, the food has been divided into three qualities namely Satwik, Tamasik and Rajasik as per their Rasas. It is known that 'we are what we eat'. Our behaviors changes according to the type of food we consume. The vegetables are also categorized vegetarian and non-vegetarian according to their Rasas. Because of their heating and rich properties only, some vegetables like Onion, Garlic and Red Lentils are avoided by Vegetarian food consumers. People eating pure vegetables and living a simple organized life has simple mind set hence, their food is called Satwik (means pure and simple). Rich spicy food, meat and liquor increases the animal nature in man, hence, they are called Tamasik (generating animal like wild behaviors). The luxurious consumption of rich food and wine, etc. by affluent class is called Rajasik (making him fat and lazy). This whole subject itself would require a full paper hence; I live it here with some examples.

TECHNOLOGY:

I will now explain how we achieve the three qualities, the Energy, The life Giving Forces and the Spirit by following the sciences of Biodynamic and Vedic or **Bio-Vedic Agriculture**:

GEOBIOLOGY:

ENERGY: Energy means strength. Energy can be of various types like the chemical energy, the heat energy, the electro-magnetic energies, etc. In agriculture, we are trying to achieve the quality of energy that would increase our strength and our Aura, the Life Force. Like the high nutrition crop can provide us with better nutrition, the high energy food can provide us with better strength and stronger “Aura”.
Physists like Earnst Lecher could detect the subtle forces, the energies with extremely low frequencies (ELF). Lecher designed an instrument called, the Lecher Antenna. This antenna is used in Geobiology to detect, identify the energy fields and measure their intensities. We would normally avoid any planting on the invisible energy ley lines and on the intersecting points of these lines, known as junctions as both on the lines and the junctions, the energy level is low measuring 2000. Any crop standing over them or any plant or tree planted over them, would not grow properly. Their growth is stunted and they are poor in quality as well as in energy. The energy from the plants growing over them is sucked or drained out.
George Lakshkvky has explained in his The Secret of Life, that “every single living cell is a living entity capable of resonating having an electrical circuit”. He built a Multiple Wave Oscillator to bring harmony and restore the equilibrium of the cells resonating in disharmony, allowing the pathogenic organisms to dominate and cause disease.

Phil Callhan, the scientist from USDA has explained in his work the nature of Paramagnetic and Diamagnetic forces read in CGS. This can be measured on the PCSM meter. The soil with higher CGS grows better.
These instruments can be useful in measuring these energies and for taking appropriate measures for better development of the growth of the crops with balanced energies.

THE LIFE FORCE

The FIVE ELEMENTS as referred in the Vedic Science and the Biodynamics, namely, AIR, WATER, FIRE, EARTH AND SPACE are known as the FORMATIVE FORCES i.e. the forces that helps in giving the shapes (the forms). Each of the five elements is represented by a form, as follows:

A dot for Space	•
Triangle for the Air/Light	Δ
Square for the Earth	□
Circle for the Fire and	O
Wave for the Water.	≈

These elements and their forms are responsible for giving shapes to the living organisms. For example, our nose related with air is triangular in shape and even our vision (light) rays travels in a triangle!

The Biodynamic practitioner uses the Biodynamic Calendar to bring about the influence of these Formative Forces and by using the various Biodynamic Preparations. While the soil is rendered sensitive by applying the various Biodynamic preparations, the planting and transplanting of the crops and conducting various agricultural activities following the astronomical phenomenon following the dates, one can manipulate the growth, control the pest, diseases and weeds, improve the quality of the food and increase the yield ranging between 10-40%.

SPIRIT

With the energy and the life force, it is also essential that good spirit and good thought process prevail in every good human being. This is achieved by following various practices explained in the ancient agricultural literatures, especially in the Vedic scriptures.

Agnihotras: Performing Agnihotra Homa with specific Mantras (syllables) right at Sun rise and Sunset brings about purity in the air and harmonizing the vibrations in the field.
There are various syllables in the Vedic texts to perform various agriculture practices for better growth and control of weeds, pests and diseases. They also bring about good vibrations (“aura”) in the crops and the food. Consumption of these food and following the disciplined Yogic life, keeps the person in high spirit, good feeling, intelligent and vibrating with aura, love and passion.

PRACTICAL APPLICATION:

I can skip explaining the standard principles of Organic Farming required for conversion. But, what is required is that high and rich quality of Biological Inputs, free from all pest and pathogenic organisms which are incorporated in the soil and which can support the soil mineral, soil microorganisms, etc. essential for the plant growth. Most people think that if you replace chemical inputs with Conventional Organic Inputs and Organic pesticides, you become an Organic Farmer. Now, you know that even every Organic Input is not safe. In India, with the advent of the organic movement, a big chaotic situation is created. The old technology of Organic farming is adopted with the only addition of Vermi composting. Neem is considered to be solution to all problems! Unfortunately that is not so. The vested interest of business community exploits the sentiments by selling the old wines in new bottles. The results: fall in the yield, size, quality, no respite from pest or diseases, atleast for initial 2-3 years. The rich can afford to sustain the initial losses because he can atleast export his crop and get compensated by higher premium. This is not possible for small farmers who have to depend on indigenous markets. But then, if we want the Organic Movement to gain momentum, we need that the system is adopted by poor marginal farmers too and he should be able to sell his crops indigenously with price for his quality and that should give him better returns in terms of his investment. It has been my experience that simply switching over to traditional organic inputs would not solve the problem. Ground reality is that the farmers are reluctant and avoid taking risks.
Therefore, after continuous studies, experimentations and research in collaboration with the farmers, we have adopted practices that detoxify the soil, increase the yield and quality from the first crop only. This has been the experience of farmers on various crops in various agro-climatic conditions of India.

I will site some examples:

Hyderabad (Andhra Pradesh):

Grape Cultivation: The farmer has been cultivating grapes with conventional inputs for more that 18 years. His annual expenditure on 32 acres would be around Rs. 7,00,000/- on fertilizers and plant protection chemicals. He would never consume grapes from his own field! He tried to incorporate some FYM but the practice was totally wrong. Most of the farmers there remove the top soil, put the layer of unripe FYM and simply cover with the top soil. This layer would remain inactive, even after six months or even for years, for the simple reason that no air can penetrate there. A total loss and lack of knowledge! I explained him that the compost must be mixed with the top 6 inches of the soil, rather, every year; he should try to increase the depth. However, I advised him to use 'VITALIZER-OV' (an ALL-IN-ONE Bio Feed & Soil Conditioner) and 'BIOHUMUS-6X' (a biodynamic compost) @ 250 Kgs. of each per acre, applied three times in a year.

Vedic Hymns (Syllables) were chanted and 'Agnihotras' were formed morning and evening. Biodynamic Preparations BD 500 and CPP were applied 4-5 times a year.

Results: In one year: The yield increased by 8%. No disease. The Brix increased by 4-5 %. The farmer consumed the grapes direct from the vines, without even washing them.

He converted part of his field to a medicinal crop 'Safed Musli' (*Chlorophytum Borivillinium*) supposed to be a substitute to Ginseng having high Aphrodisiac values. The field would normally be left exposed to the sun, even during the winter months, to allow the tubers to mature. I advised to grow marigold and some other crops as Allelopathic plants.

Results: The tubers yielded 20% more than the conventional crops, increase in the thickness, whiteness, brix reading and shelf-life.
His expenditure reduced to Rs.4,00,000/- in the very first year!

BIOVEDIC VEGETABLES: The yield increased by 15% in the 2nd year. The cost of production decreased by 50% in comparison to chemical inputs but the labour cost increased by 25%. The produce of vegetables are excellent and is taken over by FOOD WORLD, a chain store with 25%-50% premium price. Considering the reduction in the input cost and increment in the labour input, the net reduction in the cost of production is 25% but with the average increase in the premium price available, the net returns to the farmer is 50%.

In the **Biodynamic Practices**, we use certain Biodynamic Preparations that brings in the subtle formative forces from the Cosmos. BD 500 is the Horn Preparation, which brings in the Calcium influence acting as the catalyst to formation of quality organic matter content in a very short while. CPP is the poetized manure used @ 1-4 Kgs. per acre impregnated with the other BD preparations bringing in the influence of the different planets (refer my papers*).

The **Vedic Syllables** and the Agnihotra performed increased the Energy level of the entire farm which I measured with the 'H3 Lecher Antenna'.

Calcutta (West Bengal) :

Crop Paddy: In a Vedic Village Project, we have grown Paddy. The field was treated with **VITALIZER-CC** @ 300 Kgs. and Musturd Oil Cake @100 Kgs. per acre. The soil had only .08% of Organic Carbon. The seeds were treated with CPP and sown while the Moon was opposite Saturn.

Results: Yield increased by 10% in comparison to the conventional crop.

Here I would like to mention some interesting thing:

We know that the paddy grows in the water. Those who consume rice, often feels lazy and sleepy after consuming it. If you become lazy, you cannot work; your mind does not work. Result: your day is finished without returns.

We know that people with 'edemas' has high water content in their body. Some people develop the Arthritis pain during the waning and waxing moon. Why? The reason is that there is over balance of the watery element. We also know that the function of the AIR is drying. This element is also related to the LIGHT, which is related to our mind, the thinking power. Like we need to balance the nutrition of the crops or restore the microbial imbalances, similarly we need to restore the balance between the excess water with the opposite force, the Air. This is done by using the BD 501 and the BIOVEDIC preparation 'PRAKASH' (meaning light). These preparations of Quartz and Feldspar are used @ 1 gm. Per acre.

Here, I would like to draw your attention as to how to bring in the better "thinking power'.

Tomato Crop: In one of my visits to a field of a farmer, I performed test with the H3 Lecher Antennae and I was trying to detect the Hartmann Grid which measure 2.5 meters from North-South and 2 meters from East-West. To my surprise, one of the rows standing on the Hartman Grid line was 10-12" shorter than the rest of the rows in the field.

Like one tries to increase the growth by material inputs, I would like to bring to your notice that there exists these forces of nature that also needs to be understood and put to use for the benefit of our soils and crops.

PUNE (Maharashtra):

Brief description of results observed using the BIOVEDIC technique and BIOVEDIC inputs, in the following crops (recorded while the crops were only 3 months old).

Bio-Vedic Farmer's Group

No. of contract farmers (while started):	9
Area under Contract Farming:	83.75 acres
Area under standing crops:	18.75 acres
Vegetables:	13.75 acres
Fruit Trees:	5.00 acres

No. of crops cultivated:	25	
Season completed:		1 (Feb.'04 to May '04)
Total Turnover :		9.9 Lakhs.

Sick Mango Orchard:

First dose of 'VITALIZER-OV' and 'BIOHUMUS', (a fortified Biodynamic compost) was applied in the ratio of 1:2 in Nov. '03
Second dose repeated in Feb-March, '04
Results: Significant improvement was noticed in 25 days itself.
During the spring season after the 2nd dose, glorious new leaves and flowers emerged, particularly the leaf surface area increased by 50%.
The fruit size was normal with improved taste and flavour compared to before conversion.

Vegetables:
Okra: Extraordinary sweetness in taste was the exclusive effect of 'VITALIZER-CFV' plus 'BIOHUMUS'. Increase in side branching and additional bearing with intense green colour of whole fruit compared to control plot.Attack of YMV was noticed after 75-80 days whereas the control plot developed in 50 days
Yield: 10% increment over the control plot.

Brinjal: There was an initial set back due to weak seedlings but recovered to healthy state within 25-30 days of transplantation.Productivity very high at 35 days harvesting stage.
Fruit color and gloss better than conventional crop Fruit borer attack only in about 15% of the crop with almost no protective sprays.

Chilly: Similar response to Brinjal was observed.
Pest and Disease: 0%. No wastage while grading.

Cucurbit varieties did not express significant difference but it is too premature to draw any conclusion.

Cluster Beans: Taste much better than the conventional crops. The shelf-life increased by 3-6 days after harvesting.
Since inception, the farmer strength has increased to 26 within 5 months.

Bio-Vedic Consumer's Group

We organized a nodal organization to link between the Bio-Vedic Farmers and Bio-Vedic Food Consumers. The distribution is done by appointing Franchise. The consumer strength has grown to about 230 families within 3-4 months and the target is to increase it to 500 within next 6 months and to 1000 families within 2005.

Conclusion:

The primary intension is to increase the farmer's profitability by assisting him with appropriate and advanced technical know-how of Biodynamic and Vedic science which involves detoxification of the soil and improving the soil fertility and soil health to produce better yield, quality and health for providing health food for all. Our observations utilizing the additional factors that governs the additional quality, particularly the energy and the temperament of the consumers opens new vistas for those involved in designing innovative technologies for helping the farmers. This apart from regenerating health can also increase the intelligence and high spirited human beings.

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REINFORCING INDIGENOUS KNOWLEDGE SYSTEM FOR SUSTAINABLE ENVIRONMENT

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ABSTRACT : Indigenous Knowledge Systems (IKS) are strategies and techniques developed by local people to cope up with the changes in the socio-cultural and environmental conditions. Indigenous knowledge is time tested agricultural and natural resource management practices which pave the way for sustainable agricultural development. Several scientists proved that Indigenous knowledge systems can serve for environment friendly agriculture. A study was conducted to identify the indigenous agricultural practices of tribes of Kolli hills of South India. The data was collected by using a well-structured and pre-tested interview schedule. Some of the popular indigenous agricultural practices adopted by more than eighty per cent of the tribals were summer ploughing, using indigenous verities of millets and minor millets, steep penning, plant protection by using tobocco extract, dusting ash, spraying neem oil and using other neem products, soil conservation by stone bunds, soil conservation by biological means and using indigenously designed storage structures for storing grains. Based on the results suggestions are made for promoting indigenous knowledge system for attaining sustainable agricultural development.

REINFORCING INDIGENOUS KNOWLEDGE SYSTEM FOR SUSTAINABLE ENVIRONMENT

I. INTRODUCTION

(a) Indigenous Knowledge System

Indigenous Knowledge Systems (IKS) are strategies and techniques developed by local people to cope up with the changes in the socio-cultural and environmental conditions.

Indigenous Knowledge System is used by human beings since the evolution of mankind as per the needs and available resources in areas like Agriculture, Animal Husbandry, Medicine, Engineering and Weather. According to Atte (1989) Indigenous Knowledge covers the whole range of human experience. It has been tried and tested time and again at different agro-climatic conditions. IKS, which was found fit for mankind has been used and passed on from generation to generation.
According to Venkatratnam (1990) indigenous knowledge is time tested agricultural and natural resource management practices which pave the way for sustainable agricultural development.
(b) Sustainable environment

At present sustainable agricultural development is a much ‘talked about’ subject. The concept of sustainable agriculture should be as follows :

1. It should be ecologically sound (environment friendly)
2. Economically viable
3. Socially just
4. Humane
5. Adaptable

Several scientists from India and abroad proved that IKS can serve for environment friendly agriculture. (Chambers, 1983; Warren, 1989; Venkatratnam,1990). It is strongly recommended that indigenous knowledge systems can serve for sustainable agricultural development, and sustainable environment. Keeping this in mind, a study was undertaken to identify Indigenous Agricultural Practices.

II. METHODOLOGY

India is a country with rich indigenous agricultural wisdom. The tribal tracts are noted for their wealth of indigenous knowledge because of their lesser contact with the people of plains. Considering this in mind a study was conducted to identify the indigenous agricultural practices of tribes of Kolli hills of South India. Three hundred tribal respondents were selected by simple random sampling procedure from the tribal hamlets of Kolli Hills. The data were collected by a well structured and pre tested interview schedule. The collected data were analyzed with appropriate statistical tools like simple percentage analysis.

III. RESULTS

The results of the study are presented in this unit. The indigenous agricultural practices which are adopted by more than eighty percent of tribals are presented in the following table (Table – 1).

Table – 1 Indigenous agricultural practices adopted by more than eighty per cent of the respondents.

Sl. No.	Indigenous agricultural practices
A.	Land preparation
1	Summer ploughing – April – May
2	Shallow ploughing after summer rain. – to conserve moisture
B. 1	Seeds and sowing Use of indigenous Thenai, Samai, Varagu and Parivaragu varieties.
2	Soaking of paddy seeds in water for sprouting Seeds are soaked in water and covered until they sprout and used for sowing.

3	Paddy cultivation in drylands – Paddy is cultivated in drylands as a rainfed crop. Sometimes it is sown as a mixed crop with crops like Tenai, Samai, Varagu. Thus paddy is cultivated in the lands where there is less availability of water.
4	Direct sowing of paddy – It is Ideal where there is scarcity for water.
C.	Manures and Manuring
1	Sheep penning
2	Adding organic waste, farm yard manure to the soil. Green manuring, Green leaf manuring and Farmyard manuring.
3	Manuring after the I shower of rainfall
D.	Intercultural operations
1	Mulching – with plant leaves and plant fibres
2.	Crop ploughing – ploughing by country plough in the early stages of the crops
E.	Plant protection
1.	Spraying tobacco extract – tobacco leaves extract is mixed with water (1:30) and this is sprayed in the crops like Thenai, Samai Varagu and Panivaragu.
2.	Dusting ash to control pests @ 15 – 20 Kg/Ac
3.	Neem oil spray – (Melia azedarack) Neem kernel 6 to 8 kg is powdered and the powder is mixed with water (1:200). The solution is kept overnight undisturbed. Next morning it is filtered and sprayed. It controls the pests in Tenai, Samai Varagu Panivaragu and Ragi.
4.	Tying of polythene sheets to scare anyway the birds. Thick sheets are tied to a long pole and the pole is placed at the centre of the field.
5.	Beating drums to scare away the birds
6.	Pelting stones to scare away the birds
7.	Displaying crow's carcass to scare away the birds
8.	Digging the field burrows to kill the rats
9.	Burrow fumigation for controlling the rats
F.	Soil and water conservation
1.	Indigenous mechanical structure for soil and moisture conservation (1.5 to 2 m ht)
2.	Stone bunds and stone terracing (1 to 1.5 m ht)
3	Soil conservation by agronomic means Intercultivation, contour ploughing, harrowing, summer ploughing and mulching.
4.	Soil conservation by biological means Growing Trees like Andropogen, Vetiver, Agave sp, fruit groups like Mango, Jack. Mixed cropping also serves to conserve moisture.
G.	Post-Harvest technology
1.	Mixing of pulse seeds with ash for storage of seeds
2.	Mixing of ashes, lime and crushed chillies with stored grams
3.	Mixing of green gram with sand

4.	Mixing of red earth with red gram for storage.
5.	Storage of cereal grains in kudhir
6.	Storage of cereal grains with neem leaves.
7.	Use of nochi leaves (Vitex negunda) are kept along with the pulse seeds for storage.
H.	Miscellaneous practices
1.	Incorporation of ash in soil for soil reclamation of acidic soil. It improves the texture and structure of soil.
2.	Cow dung smearing for the propagation of stem cuttings.
3.	Fumigation in closed containers for ripening of fruits like Banana, Mango. Smoke is produced inside the containers by igniting dried wooden fibres.

IV. SUGGESTIONS FOR PROMOTING INDIGENOUS KNOWLEDGE SYSTEM TOWARDS ATTAINING SUSTAINABLE ENVIRONMENT

1. Record Indigenous Practices:
The indigenous agricultural practices that serve for sustainable environment can be recorded by various methods like survey, group discussion, key informant techniques, and other participatory appraisal techniques for dissemination to other locations.

2. Feel proud of Indigenous Knowledge:
The tribes can be made to feel proud for their wisdom in indigenous knowledge system and thus they can be encouraged to practise the traditional agriculture, which serve for sustainable environment.

3. Encourage Formal Research and Development in Indigenous Knowledge System:
As it is recommended that indigenous knowledge system aid for sustainable environment formal research and development can be focussed on indigenous knowledge practices of tribes. The valid practices, which serve for sustainable environment, can thus be disseminated to all farmers.

4. Curriculum Development:
Valuable indigenous practices can be included for formal curriculum programmes like B.Sc. (Ag.), M.Sc. (Ag.) and Environmental Studies Programme. Thus these practices can be taught to many students.

5. Extension Approaches:
The valid indigenous agricultural practices, which serve for sustainable environment, can be disseminated by formal extension methods and programmes with the help of the extension workers of Government and Non-governmental agencies.

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SIGNIFICANCE OF MICROBIAL TOOLS IN ORGANIC FARMING

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Abstract: Microbes are an integral part of every soil ecosystem. Various kinds of biological activities are continuously going on in the soil. Almost all the beneficial microbes essentially need carbon source for their survival. This explains as to why the soils poor in the organic matter content are usually poor in microbial activities.The soil contains an enormous number of different organisms, varying widely in both size and function. All of them, however, play an important role in the neutralization of nutrients in the soil. At the lower end of the scale, there are the microorganisms such as algae, protozoa, fungae and bacteria. Further up the scale in terms of size come to nematodes, springtails, small arthropods and enchytraeid worms and arthropods. Each of these organisms has a specific role or function within the soil. The vast majority of soil organisms function as consumers and decomposers. As part of the aim of creating a sustainable agricultural system, the principle of operating as far as possible within a closed system for crop and livestock nutrition is fundamental to organic systems. This entails minimizing the use of nutrient inputs from outside as well as losses from within the system. Nutrients are constantly sold off the farm in produce. Unnecessary losses must be therefore be minimized by making use of natural recycling processes and biological nitrogen fixation. A healthy, biologically active soil is the basis of this recycling process, requiring the replenishment of organic matter and nutrients removed by crop harvesting.

Microbes are an integral part of every soil ecosystem. Various kinds of biological activities are continuously going on in the soil. Almost all the beneficial microbes essentially need carbon source for their survival. This explains as to why the soils poor in the organic matter content are usually poor in microbial activities.

The soil contains an enormous number of different organisms, varying widely in both size and function. All of them, however, play an important role in the neutralization of nutrients in the soil. At the lower end of the scale, there are the microorganisms such as algae, protozoa, fungae and bacteria. Further up the scale in terms of size come to nematodes, springtails, small arthropods and enchytraeid worms and arthropods. Each of these organisms has a specific role or function within the soil. The vast majority of soil organisms function as consumers and decomposers. As part of the aim of creating a sustainable agricultural system, the principle of operating as far as possible within a closed system for crop and livestock nutrition is fundamental to organic systems. This entails minimizing the use of nutrient inputs from outside as well as losses from within the system. Nutrients are constantly sold off the farm in produce. Unnecessary losses must be therefore be minimized by making use of natural recycling processes and biological nitrogen fixation. A healthy, biologically active soil is the basis of this recycling process, requiring the replenishment of organic matter and nutrients removed by crop harvesting.

Nitrogen is one of the most abundant gases found in the atmosphere but unusable by the plants in its gaseous form. Many microbes, are however, are capable of converting the gaseous nitrogen to nitrate. The nitrates can be easily utilized by the plants. This process is called 'Biological Nitrogen Fixation' (BNF). BNF has an assured place in agriculture mainly as a source of nitrogen for legumes and other important crops. On a global scale, BNF provides the largest input of nitrogen to agricultural soils. Inoculation of Rhizobium as biofertilizer in the crops such as groundnut, pigeonpea, soybean etc. provides 19-22 kg of nitrogen per hectare which increased production by 17-33 per cent. Similarly use of non-symbiotic bacteria Azotobacter in wheat, sorghum, tomato, cotton, sugarcane and Azospirillum in wheat, maize, rice, sorghum crops augmented nitrogen supply to crops to an extent of 20-30 kg per hectare. Thus, resulting in increased crop yield by 10 to 30 per cent.

Blue green algae (BGA or cyanobacteria) are phototropic organisms that grow wherever water, sunlight and carbon dioxide are available. The rice ecosystem is an ideal environment for the growth and development of these self supporting organisms. A large variety of nitrogen fixing BGA such as Anabaena, Nostoc, Aulosira, Ealothrix, Tolyphothrix etc. colonize the rice field soils. Nitrogen is considered to be 'kingpin' of essential nutrients and is an example of deficiency in sufficiency, considering the presence of 80,000 tonnes of N in the atmosphere over an hectare of land. All living beings with the exception of those members endowed with 'NIF' (Nitrogen fixation) genes depends on fixed nitrogen to meet their requirements. The conversion of inert nitrogen is facilitated by the enzyme nitrogenase, present in the nitrogen fixing microorganisms which are marked with 'nif' genes. They synthesize nitrogenase enzymes responsible for converting inert N2 to plant usable NH3. The combination of nitrogen and hydrogen forms ammonia through biological processes (BNF) towards enriching earth surface with nitrogen symbiotic, asymbiotic or phototropic modes (Table 1).

Table 1: Nitrogen fixation in the surface of earth though various sources

N fixation	106 tonnes/year	Per cent contribution
Industrial fixation	40	15.3
Atmospheric fixation	10	3.8
Combustion	20	7.6
Ozonization	15	5.7
Biological fixation	175	67.3

Non-symbiotic or free living organism fix nitrogen in the soil and they can be categorized into obligate aerobic, facultative and anaerobic organisms. Associative symbiosis refers to an intracellular relationship in between plant roots and a dinitrogen fixing bacteria like Azospirillum which are found in cortical cells and protoxylem vessels in Digetaria, Panicum, maize, sorghum, wheat, barley, pearl millet and a number of other crops. Symbiotic nitrogen fixing bacteria, Rhizobia, fix nitrogen in root nodules of leguminous crops. The symbiotic association of cyanobacterium, Anabaena, azollae and the water fern azolla are potential sources of nitrogen. Frankia, an actinomycete, forms nodules called acrtinothize in woody species (Table 2).

Table 2: Nitrogen-fixing microorganisms in arable soils

Association type	Organism involved
1. Asymbiotic	
Bacteria	
Aerobic	Azotobacter, Beijerinkia, Derxia, Azomonas, Azotococcus, Methanosinus, Azotobacter
Microphyllic	Azospirillum, Aerbaspirillum, Corynebacterium, Thiobacillus
Facultative	Klebsiella, Basillus, Encerobacter, Escherichia, Citrobacter, Pseudomonas
Anaerobic	Clostridium, Propionibacterium, Desulfavibris, Rhodospirillum, Rhodopseudomonas
Algae	
Blue green algae	Nostoc, Anabaena, Aulosira, Calothrix, Polypothrix, Chlorogloea, Apanothece, Schizothrix, Scytonema, Stigonema, Anabaenopsis, Campylonema
2. Symbiotic Bacteria	Rhizobium with legumes and parasponia, Azotobacter paspali with paspalam notatum
Actinomycetes	Frankia with woody trees
Algae	Anabaena azollae with azolla, Anabaena/Nostic with cycads, Nostoc with gunnera lichens

The common beneficial organism which may be used for preparing biofertilizers are given in Table 3.

	Microorganisms	Contributing plant nutrients
1.	Symbiotic	
	a) Rhizobium (with legumes)	Nitrogen
	b) Azolla (Azolla and Anabaena Azollae)	Nitrogen
3.	Associative symbiotic	
	a) Azospirillum	Nitrogen
	Non-symbiotic	
	a) Azotobacter (Herterotrophs)	Nitrogen
	b) Blue green algae (photoautotrophs)	Nitrogen
4.	Others	
	a) P solubilizers and mineralizers	Phosphorus
	Fungi: Aspergillus, Penicillium	
	Bacteria: Pseudomonas, Bacillus	
	b) P absorbers (Root fungus symbiosis)	Phosphorus and zinc
	VMA (Vesicular Arbuscular Mycorrhiza)	

The biological nitrogen fixation system can be grouped into three categories:
1) Symbiotic non-leguminous symbiotic system.
2) Legume-Rhizobia symbiosis
3) Other symbiotic nitrogen fixing systems

Blue green algae and Azolla-Anabaena association in tropical rice fields, rhizobium-legume symbiosis both in tropical and temperate conditions, non-symbiotic bacteria like Azotobacter and Azospirillum could be an important source of nitrogen in organic farming only need is to develop strains of bacteria suitable for different crops in different agroclimatic conditions and soil types to fully harness the benefit from the N fixers.

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6th IFOAM-Asia Scientific Conference
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7th – 11th September 2004. Yangpyung / Korea

TRADITIONAL KNOWLEDGE & BIODIVERSITY

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Traditional Knowledge is the latest buzzword. India is a signatory to the convention on Biological Diversity. The Biological diversity Act 2002 seeks to Protect and regulate India's natural resources and traditional knowledge. A three – tiered system of regulation is envisaged under the BD Act, which consists of the National Biodiversity Authority at the head, followed by State-level biodiversity boards and local level bio diversity management committees.

The draft rules for the BD Act 2003, specify that the NBA take steps to build a Database and to creat information and documentation system for biological resources and associated traditional knowledge through biodiversity registers and electronic databases.

Meanwhile, the ministry of environment and forests has asked the center of Ecological Science at the Indian Institute of Science. Bangalore, to conduct regional workshops to evolve and prepare a detailed manual for PBRs. These will be a storehouse of all biodiversity- related information, practices and knowledge of community and its immediate surroundings.
One proposal is to set up a computerized database and prepare a biodiversity information system (BIS) which can be accessed by every one, even at the Panchayat label. One can visualize that each Panchayet will have a PBR and we are looking at a total of 300 PBRs to begin with, all over India.

While there is support for the need to document people's knowledge and a computerized database and access system, activists working with adivasis and others marginal groups are questioning the present BD Act as well as such documentation.

When people in the first place do not have the rightto land where is the question of rights over their resources? About 20 percent of plants have disappeared due to excess marketing since their value has been recognized. By putting down people's resources on paper, specially if it concerns adivasis, one would be monitoring their resources.

PBR is another way of making money off natural resources. PBRs promote the intellectual property right (IPR) regine.

Biodiversity has became a source of business and the Government is promoting this, " Documenting biodiversity is a conspiracy to steal people's knowledge. Whenever knowledge is documented, it tends to go out of people's hands. How can you talk of biodiversity registers when people don't even have books? Here, a class X adivasi boy cannot even write on application. How will they access such information?

In villages like Mahadapur in Yayatmal district (Maharashtra), where there is no electricity and telephone, Ajay and Yogini Dolke of Srijan , say, " we want to use PBRs as a tool to help gain access over forest produce. Once we know the biodiversity around us, we can limit its use and plan accordingly. We work with Kolam adivasis, and most of the literate people, leave. There is on school beyond the fourth class. In this scenario, using computers is out of the question. People would feel happier with a register they can see (in concrete terms) and identify.

But the Govt. thinks otherwise. " we have the responsibility to educate people on the implications of sharing their data and knowledge with the world. The decision has to be an informed one I feel the information can be adopted for use by illiterate people as well. Illiterate women in Madurai are using computers. The way the datas is presented has to be innovative – it can use icons, use local languages and dialects.

At things stand, the final decision on PBRs will be taken by the NBA once it is constituted.

Ashish Kothari of Kalpavriksh, Pune, say, "If the data is only computerized, then it will be a challenge for communities not only to access the information but also to protect it. Communities must have the liberty to choose what information they want to collect and how they want to collect, store and share it. Another key question is how can this information be pretected against misuse, especially against piracy?

The Andhra Pradesh coalition in defence of Diversity, a network of 140 civil society groups spread across 23 districts has been taking steps to Publicise the rich agri-biodiversity in the state. The coalition started by creating what they prefer to call community bio-diversity registers or CBRs, in every mandal
(administrative unit). And over two years, more than 600CBRs have been prepared.

People have found their own ways of collecting and storing the information in the form of drawings, books or icons. The information is shared among communities in the form of district level exhibitions, fairs and mobile bioderversity yatras across villages, regarding the PBRs howevers, PV Satheesh convenor of the coalition, fears that communities would take a back seat.

The Central question, however, is whether documenting the knowledge will help communities gain rights over resources. Is knowledge being lost because of compitition from other practices?

It is vital that people have the right to make decisions on the use of their resources, as a prelude to preparing registers Knowledge is power but that power cannot go in to the hands of the already powerful. That would defeat the very spirit of the convention on Biological Diversity.

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To obtain sustainable Organic Rice Production through community based Management strategy.

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Abstract: The community-based management strategy in Organic Rice cultivation comprise three sequential but interrelated activities: (1) formation of village development committee (VDC), (2) linking VDCs with existing development activities through local NGOs and, (3) management of production enhancement and conservation. The first set of activities has been accomplished by a "survey NGO"and do not actively involve local DAE staff. The second set of activities has been carried out by the "implementation NGOs" together with a consultative role by the local DAE. The third set of activities involved the local DAE more actively however to enhance the capacity of the community to manage Rice field on their own in future. The formation and sustenance of VDCs is the cornerstone of the community-based management strategy. Unless the VDCs are in place, no IPM activities will be undertaken. At the village level, VDCs will coordinate development plans and their implementation. At the Soil level, VDCs will provide representatives to form Crop Management Committee(CMC) in order to represent interests of the villages in the management plan formulated by the CMC. Resource assessment, planning, Cost/benefit, training and leadership building, monitoring and evaluation has been carried by the VDCs One important lesson learned from these work that transfer of administrative control does not automatically result in the transfer of management control from the government to the community. It is established that community-based management would be enhanced their negotiation and planning skills to mobilize and make more resources to make their livelihood more sustainable.

In some communities, the adoption of conventional agriculture has substituted traditional cultivation systems with high biodiversity for mono crops of genetically similar individuals. In a relatively short period of time, such systems have led to environmental degradation, social disintegration and misery within communities. However, many traditional agricultural systems that have been the basis of food security and community cultures have since been saved through organic agriculture approaches.

The introduction of organic management, based on traditional experiences and new knowledge of natural processes, has allowed the maintenance of the agro-ecological systems and has improved socio-economic conditions of rural communities, especially in environmentally vulnerable areas. These agricultural systems are also based on strong farmer participation in the decision-making process, exchange of information and distribution of benefits.
The examples below illustrate the community-based rehabilitation of abandoned and degraded agro-ecosystems, through organic agriculture, in flood plains of Bangladesh and mountainous areas of Indonesia and Mexico. The poly cultures systems established by these communities (like many others around the world) are characterized by highly diversified ecosystems and an

improved agricultural biodiversity. The good markets associated with organic products has not only provided food but has also generated further community services.

In the flood plains of Bangladesh, community-based organic agriculture resulted from an increasing awareness to the harmful effects of the Green Revolution. The latter was showing a tremendous decline in crop yields despite an enormous increase in the need for the application of fertilizers and pesticides. Groundwater was less available, livestock and fish populations were diminishing, the health situation was worsening (including gastric, skin and respiratory diseases) and exogenous varieties were gradually replacing traditional varieties. This forced many poor farmers to sell their land and other productive assets, shifting from farming to non-farming occupations.

Microbial Inoculants in Organic Rice Production

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Abstract: Rice is the backbone of the agricultural economy and the staple food in Nepal as it is to most of the people in the countries of Asia Pacific Region. Rice production has been increased by the increase in area planted, introduction of high yielding varieties, extensive use of chemical fertilizers and pesticides. However, these gains also contributed to environmental pollution, biological imbalances, health hazards and soil degradation which has resulted into decreasing rice productivity at present with increasing cost of production. Organic production is more sustainable alternative that is being established and promoted in rice cultivation practices. Microbial inoculants in organic rice cultivation maintain not only quantity but quality of rice, biological balances improving the soil and environment.

Microbial (EM) application with compost promoted the development of vigorous root system, sustained the growth and yield of rice better that compost alone and comparable with chemical fertilizers. It also increased the diversity of soil organisms, improved the soil tilth and soil nutrients.

Introduction:

In Nepal, rice is life, economics and politics as it is the staple food and source of livelihood of the majority of the population and a major impeller of national development. The introduction of high yielding varieties that needed more chemical fertilizers and pesticides increased rice production to some extent. However, it also led to environmental pollution, biological imbalances and soil deterioration. Alternative technologies have been sought to address these concerns while maintaining high yield levels to feed the increasing population. One of these is the use of effective microorganisms (EM) technology as microbial inoculants that utilizes naturally occurring beneficial microorganisms as an added dimension of organic based rice production system. EM is a mixed culture of naturally-occurring, beneficial microorganisms (predominantly lactic acid bacteria, photosynthetic bacteria, yeast, actinomycetes and fungi) that has reportedly enhanced soil quality and bio-diversity and increased the growth, yield and quality of crops (Higa and Parr, 1994).

EM is applied as soil and plant inoculants to increase microbial diversity and activity in the soil and on the phyllosphere of plants that complement the indigenous microbial species in improving the soil health and suppress pathogenic species while facilitating the decomposition of organic materials and synthesizing nutrients essential for plant growth and yield (Higa, 1998).

This paper presents the results of the effects of EM applications in rice production systems in Nepal.

Materials and Methods.

Rice was cultivated according to the designed treatments with 3 replications and used for EM applications in various formulations. EM secondary, EM-FPE (fermented plant extract) and EM-Bokashi were prepared from EM stock solution and these preparations were used at different times according to each experimental design. Field monitoring and observation have been done based on the field research guidelines.

The experiments were laid out both in Terai (Morang) and hills (Kathmandu valley, Kavre & Nuwakot).

Table 1. Effect of EM on Height of Rice Plant

Treatment	Plant Height after Transplanting (cm)		
	30 DAT	45 DAT	60 DAT
1.	61.3	75.9	88.6
2.	62.7	81.0	89.5
3.	65.4	78.6	90.0
4.	64.7	79.4	91.0

Control pot with manure 300 kg + 6kg urea + 10kg super phosphate + 3kg potassium sulfate per plot (360 sq. meter)
Manure replaced by EM bokashi 150 kg.
As control plus EM-FPE sprays beginning at 10 DAT at 10 days interval
As control plus secondary EM sprays weekly beginning at 10 DAT.

DAT-days after transplanting

In all treatments with EM the plants have a little taller plant height, leaf blade larger; more healthy and greener than control plot. Likewise the grain yield was higher in all the EM applied treatments, the highest yield recorded in the Treatment (No. 4). Subsequently, some insect pests density and disease incidence were low, reducing about 30% damage (table 2).

Table 2. Impact of EM on Reducing Insect Pest and Disease Incidence.

Treatment	Sheeth Blight Leaf Infected	BLB Leaf Infected	Stem Borer white heads at Milky stage %
1.	19.6	10.40	0.91
2.	14.7	10.50	0.85
3.	9.75	6.20	0.40
4.	10.05	6.25	0.35

Among insect pests and diseases the EM showed a good result in reducing the disease incidence, especially for bacterial leaf blight as one major and difficult target disease to manage by other chemical pesticides.

Effect of EM spray on Rice Yield

Treatment: 2 (EM spray and no spray)
Replication: 3 farmers fields in the hills (Nuwakot district)
Plantation: Rice plantation was done as usual in June
First spray of EM: 12th July
Number of spray: 7 spray at weekly interval
EM spray dilution: 1:1000

S.N.	Element	EM spray Plot	Control plot
1.	Number of heels/sq. mt.	60	60
2.	Number of tillers/heels	12	9
3.	Number of leaves/plant	35	28
4.	plant height (cm)	70	65
5.	Grain weight/sq. mt.	455 gm	430 gm
6.	Straw weight/sq. mt.	1660 gm	1430 gm

Increased yield of rice grain by EM spray: 250 kg/hectare
Increased yield of rice straw by EM spray: 2300 kg/hectare

It has been recorded from farmers' fields' research on rice in eastern Nepal (tropical area) that EM (5 liter EM extended and applied/ha) application during pre-planting land-preparation and 5 spray (0.05%) in the standing crop has resulted 15% increase in grain yields over chemical fertilizers (as prescribed by Agri. Office) used fields.

Other Remarks: Weeding was not required in EM applied fields.
No significant appearance of rust spot was observed.
Rice plants were sturdy; thus no lodging problem.
Unfilled rice grain was insignificant in EM plots.

Conclusion:

All the above results and observations are in line with various research findings. EM inoculation increased kernel enlargement after the panicle formation stage and also increased ear number, length and kernel number (Shinji Iwaishi-2000).

Microbial applications have been effective in organic rice both in protection and production aspects.

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Principles of Organic Agriculture
– A review validity of the most basic values of the organic movement

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Abstract : Currently the International Federation of Organic Agriculture Movements (IFOAM) is in the process of rewriting the Principles of Organic Agriculture4. Up to now, the principles functioned as an introduction to the IFOAM Basic Standards. IFOAM's World Board plans to come up with a motion for the next General Assembly. Therefore a Task Force and Consultative Group have been set up to organize the work. The final result will be a self-standing document, no longer directly connected to the Basic Standards. The principles should reflect a balance between 'clear and short' and 'complete and holistic' and they should be precise 'Principles of Organic Agriculture' and explicitly distinct from principles for a better world. Another outcome is the process itself, which gives the organic movement the opportunity to reflect upon, discuss, and test the validity of its most important values.
The Asian organic community is kindly invited to contribute to the process during the 6th IFOAM-Asia Scientific Conference and General Assembly.

Note:
This article reflects the process and state of affairs up to June 2004, the time of writing. However the process will continue and will have proceeded by the time it is discussed at the 6th IFOAM-Asia Scientific Conference. The authors will update the participating organic movement orally during their presentation.

Mission
IFOAM's mission is leading, uniting and assisting the organic movement in its full diversity. Our goal is the worldwide adoption of ecologically, socially and economically sound systems that are based on the principles of Organic Agriculture.
History and process of rewriting

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[4] Ecology and Farming No. 36 May-August 2004 holds a special feature on Principles of Organic Agriculture (pp 22-33). Parts of this article are taken from the feature.
The process can be followed at www.ifoam.org

IFOAM's mission statement and goal refer to the principles of Organic Agriculture. They provide the glue that binds together everything that IFOAM says and does. In order to move on from this general statement to tangible outcomes, it is necessary to go into detail as to what is meant by the 'principles of Organic Agriculture'.
Historically, IFOAM has included a list of principles in a front section of the IFOAM Basic Standards, where they served as an introduction to the Standards. They were written down to clarifying the aims of Organic Agriculture and were directly connected to the Standards. Over time they were changed as new chapters were introduced (e.g. processing). Furthermore, the changes reflected general trends in language and IFOAM's 'englishification'.
In 1984, IFOAM used eight points to express the principle aims of agriculture. These eight points were supposed to cover agriculture in general; and only in combination with certain techniques were they thought to be of relevance for Organic Agriculture. They functioned as an introduction to standards for 'Biological Agriculture'.
The issue on animal welfare was interesting; written as: 'To give all livestock conditions of life that conform to their psychological needs and to ethical principles' (italics by the author), it was, unfortunately, a drafting mistake and should have been 'physiological needs'.
By that time IFOAM's members recognized they were living in a world less ideal than their own principles and therefore an extra introductory text was inserted explaining what to do 'where compromise is inevitable'.
From 1989 to 1994, the principles were listed under the heading 'The principal aims of Organic Agriculture', and were used as the introduction for the Basic Standards. In 1993, the issue of GMOs came up. Consequently, the 1992 version of the Basic Standards was given an addendum that expressed an amendment made by IFOAM's World Board in 1993: 'whereas no genetically manipulated organisms or products thereof are used in organic farming, food and/or products.' Although an important issue, over time the Standards Committee realized that the ban on GMOs is not a principle as such, nor is it an aim of organic agriculture, but rather it arises from the principles. Responding to this, the issue went from being mentioned in an extra paragraph in the 1994 version to an extra note in the 1996 version to, finally, a stand-alone chapter in the 1998 version. In the most recent version of IFOAM norms, the issue of genetic engineering is part of chapter 2 in the IFOAM Basic Standards on Organic Ecosystems.
In 1996, the increased importance of processing within the organic movement was recognized, and the title subsequently changed to 'The principle aims of Organic Production and Processing'. The introduction of processing meant that the Standards
Committee used 17 points to express IFOAM's principles. This stayed unaltered until 2000. The current principal aims of Organic Production and Processing contains 15 points, where the last formulated point is new and expresses the importance of indigenous and traditional farming systems.
The wording in the title '… principal aims...' has given rise to a misunderstanding. Some people in the sector understood these as principles and others as the aims of Organic Agriculture. In addition, some observed an 'inflationary' effect – as over time the Standards Committee used more and more words to express the principles – while others have increasingly recognized that Organic Agriculture contributes to several aims.

General Assembly Victoria 2002

During IFOAM's General Assembly in Victoria, Canada, the Basic Standards revision procedure was discussed. During this discussion an amendment was accepted that stated 'Any change in the basic principles (section B.1) would have to be approved by the GA'. This amendment was taken very seriously by IFOAM's World Board who interpreted it to mean there is a need for the principles to be reworded. The World Board is of the opinion that the principles could be better understood if it is made clear that they provide a basis for the organic sector and an explanation to the outside world on what organic is about. The issues that go 'beyond the standards' can be given credence by the principles, something that is not possible in the Standards as such. The World Board plans to come up with a motion for the coming General Assembly in Adelaide, Australia, in 2005 on the Principles of Organic Agriculture.

The actual work

To organize this work the World Board decided to set up a Task Force and a Consultative Group. This approach solves the potential tension between 'large and inclusive' and 'small and workable'.

Members of the Task Force are diverse in background, gender, location and profession:

- Hugo Alroe (Denmark)
- Roberto Ugas (Peru)
- Liz Clay (Australia) (in addition serving as WB liaison)
- Brian Baker (USA)
- Lawrence Woodward (United Kingdom)
- Guy Rilov (Israel)
- Bassoum Souleymane (Senegal)
- Dr. K. Vijayalakshmi (India)

To set the scope for the work, in January 2004, IFOAM's World Board formulated Terms of References and a preamble. The preamble reads:

'We hold these Principles as the foundation of the Organic Movement. The Principles of Organic Agriculture are also the roots from which the International Federation of Organic Agriculture Movements (IFOAM) grows and develops. As such they are relevant for the development of positions, programs and standards. They express the potential contribution that Organic Agriculture can make to the world, and the vision of how all agriculture should function in the larger context, recognizing that the desirable future cannot always be realized today. Agriculture is one of humankind's most basic activities, since we need to nourish ourselves daily. Through agriculture we prepare the world to be eaten, we organize it so it can become part of us, so it can transform us. Furthermore, it expresses the way people relate to the soil and landscape. History, culture and community values are embedded in agriculture. The Principles are not limited strictly to agriculture; however, agriculture is both the starting point and the main focus of the Principles.'

With these directions given the work could start.

During Biofach 2004, the issue was presented during an event at the BioFach Congress. The participants provided input and suggestions on how to embark on the process.

To get started the Task Force formulated strategic questions for the Consultative Group. The answers on these questions are to provide the framework in which the principles can be spelled out.

1. Currently IFOAM has principal aims. What do you see as the principles behind these aims?
2. What kind of work are the principles doing in the organic movement?

3. What does this require with respect to the form and number of principles?
4. Do you have any visualization/materialization (*e.g.* a photo, art, a poem) that expresses for you the principles of organic agriculture? Could you articulate in one sentence the relationship of this photo, painting *etc*. with the principles of organic agriculture?[5]

From the feedback to these questions the Task Force extracted the following points regarding the purpose, function and form for the Principles of Organic Agriculture during its first meeting in May 2004 in Bonn, German.

Purpose:

- To set the framework for Organic Agriculture
- To be the foundation for the movement
- To give guidance (in standards, policies, in general)

Work the principles are going to do / function:

- Lead and unite the organic movement
- Inspiration (internally for the movement, externally for change)
- Universal principles that are regional applicable
- Identity

Form:

- Simple
- Ethical

The notion of 'ethical' deserves some explanation[6]: In order for the principles to function as guidelines and organizing principles, they need to be normative i.e. some kind of moral or ethical principles. Goals are not sufficient, because goals can be reached, but not used for setting new goals. Standards and regulations are not sufficient because concrete rules are to be developed in accordance with deeper goals or principles. Law-like or nature-given principles, like the principles of physics, are certainly insufficient, because they merely state how the world is and not how it should be. Values as such, or value-laden differences as commonly used in marketing concepts are not sufficient, because they only refer to individual preferences and have no guiding force.
The organic movement however is concerned with more than preferences: IFOAM is concerned with the proper way to do agriculture and produce food – how it *ought* to be done. Therefore the kinds of principles that are required are normative or ethical principles for how to act 'in an organic way'. By being ethical they claim to hold for other as well as for oneself. They state how responsible people ought to behave, as opposed to simple values, aims, preferences, etc. that bear no such claim in themselves.

[5] The Asian organic community is invited to express principles of Organic Agriculture in art form. All the pieces will be presented during the coming General Assembly, September 2005, Adelaide, Australia.
[6] Explanation taken from Alroe and Kristensen as provided in Ecology and Farming No. 36 May – August 2004

Once the purpose, function and form were given, the Task Force started to identify ‘thematic areas’ that merit the elaboration of a principle. - Every member of the Task Force set out the 4 most important notions (according to their own opinion of course). These notions were elaborated in groupings after which eventually 8 areas were identified. Some Task Force members however could imagine other functional groups or other cross cutting themes.

In elaborating the grouping the Task Force realized:

- That the WB gave a preamble that set the scope
- That the exercise of grouping as such was more important than the ‘heading’ / ‘title’ given to each group of cards[7]. The wording for the heading still can change, however the set of cards together in one group should point out what the ‘thematic area’ or ‘sphere’ is about.
- That the thematic areas identify the contribution of OA to a better world (as being the OA-specific subset), but cannot be goals on their own for the OA movement. Or in other words: it is through the ‘OA glasses’ that we have to look at these areas. OA cannot cure all the worlds’ injustices, but it makes a contribution to a better world.
- That the principles individually cannot distinguish what OA is about. Only together can they identify OA. It is possible that in a specific situation or location one is more important than the others and thereby gets more attention. However if we want to have them as guideposts they should be considered as working together. Taken together their effect is synergetic.

Again the Consultative Group was given three questions on this work:

1. Are the themes presented comprehensive enough to reflect the principles of organic agriculture? Do you feel a need for addition to the individual themes? Are there themes or areas you’d like to suggest to be included?

2. Do you like to add other connected keywords? This might be of help in the stage of formulating the principles.

3. Do you see a possibility to simplify the identified themes? Do you see two or more common themes that can be combined in a single theme? Or do you e.g. see a kind of hierarchy or order in the themes?

[7] In the discussion in the Task Force it was remarkable to learn how ‘language’ and ‘wording’ have different meanings in different parts of the world. The notions ‘indigenous knowledge’ and ‘traditional knowledge’ have different connotation in Africa and India. In Africa, ‘traditional knowledge’ is preferred as ‘indigenous’ sounds too much like a humiliating remark from colonialists in the past. In India however ‘indigenous’ is a notion that one can express with pride. It is a challenge to accommodate these different perceptions in one notion and eventually in one principle.

This round of input delivered groups of words and notions on which a first rough draft can be elaborated.[8]

'Holistic health'
Connected keywords: Ecosystems, 'health of soil, plant, animal and man is one and indivisible'; Illness is part of it, to be cured (not abolished); History, practice and memory – and future; Part of where we come from – and go to?; Self-regulation; Human-life world

'Livelihood – equity'
Connected keywords: Fair; Justice; Right livelihood; Stewardship; Transparency; 'Ecological justice'; Inter-generational; Development and food security; Chances

'Biodiversity'
Connected keywords: Protection; Enhancement –bio development; Functional diversity; Natural diversity; Genetic diversity; Local application; Regional diversity; Plant breeding

'Soil'
Connected keywords: Maintain and enhance soil fertility; Living soil; Fertility; Soil organisms; OA is based on long-term fertility through biologically active soil; Manifestation of health in soils; Stop erosion and desertification; Balance; Natural processes

'Cyclical systems'
Connected keywords: Appropriate technologies / low impact; Low negative impact; Minimal / responsible use of finite resources; Re use; Recycle; Regeneration; Working with nature; Incl. role of animals in the agro eco system; Development of higher degrees, e.g. ripening processes; Cycles in the field, on the farm and in the agro-food system

'Animals'
Connected keywords: Production; Keeping; Welfare; Natural behavior; Physiology; Not excluding any animal; Integrity; Breeding; Adaptation to individual farm sites; Linked to the soil

'Local markets / accessibility'
Part of cyclical systems?
Does this leave out all other markets?

'Precautionary principle'
Connected keywords: Impact of unforeseen consequences; Relation to new technology; Possible danger in future; Burden of proof

By trying to formulate the first rough version, the Task Force uses the following scheme

1. Simple statement (the principle)

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[8] At the time of the 6th IFOAM-Asia Scientific Conference and General Assembly the consultative group will have given a feedback on this first rough draft. It is planned that the authors will present the elaboration of this feedback.

2. Meaning / purpose
3. Linkage to other principles
4. Sub themes that may flow from it
5. Items for discussion
6. Background (history, consultative input)

By comparing the linkages to other principles and the sub themes that may flow it is expected that convergence, order and hierarchy can be identified.

At the time of submitting this paper for the 6th IFOAM-Asia Scientific Conference and General Assembly the above reflects the process and the current state of affairs.

Expected Result

The final result will be a self-standing document, no longer directly connected to the Basic Standards. The viewpoint will be slightly different, as the title will be changed from 'principal aims' to 'principles', thereby clarifying their purpose. The final principles should reflect a balance between 'clear and short' and 'complete and holistic' and they should be precise 'Principles of Organic Agriculture' and explicitly distinct from principles for a better world. Another outcome is of course the process itself: Writing a set of principles and then, from time to time reconsidering them, is an important process for our movement. This process gives us the opportunity to reflect upon, discuss, and test the validity of our most important values.
The input from the 6th IFOAM-Asia Scientific Conference and General Assembly is part of this result.

6th IFOAM-Asia Scientific Conference
"Benign Environment and Safe Food"
7th – 11th September 2004. Yangpyung / Korea

USE OF BM-TECHNOLOGY IN INTEGRATED NUTRIENT MANAGEMENT FOR RICE – WHEAT AND COTTON PRODUCTION

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Abstract : Modern agriculture is based on the use of chemical fertilizers and pesticides for crop production. The increase of prices of fertilizers had made it unaffordable for common farmers to use it at the recommended rates. Studies were conducted to utilize the available on farm organic resources with beneficial microorganisms for enhanced productivity of crops. Experiments were conducted in 2000-2001 on rice-wheat and cotton to compare the chemical fertilizers and organic resources of nutrients with and without the inoculum of beneficial microorganisms. Farm Yard Manure (FYM) was used as organic source @ 20 t/ha, that it was inoculated with 1% solution of microorganisms to ferment FYM as FYM-Biokasht. FYM and FYM-Biokasht was integrated with half and full dose of minerals fertilizers. Results of the experiments showed that a maximum paddy yield of 4.45 t/ha was obtained where we applied recommended dose of NPK followed by ½ NPK + FYM-Biokasht (3.56 t/ha) and similar trend was found in straw yield. Maximum wheat grain yield of 2.26 t/ha was found in recommended dose of NPK and was statically at equivalent to ½ NPK + FYM-Biokasht. In case of seed, maximum seed cotton yield of 533.87 kg/ha was noted where we applied recommended dose of NPK and was statically at parr with ½ dose of NPK + FYM-Biokasht.

Introduction:

Agricultural production can only be sustained on a long-term basis if the land, water and forest in which it is based, are not degraded. Therefore, there is an urgent need for sound management practices to increase soil fertility, and minimize environmental pollution. Although, chemical fertilizers, being energy intensive for production may continue in the foreseeable future to be important for agricultural systems yet supplementing with organic and bio-fertilizers will enhance productivity especially in areas with degraded soils. The beneficial role of organic matter in improving the physical, chemical and biological properties of soil is well understood. Organic matter provides considerable part of macro and micro nutrients, that can be advantages, particularly when mineral fertilizers are scarce and costs are prohibitive for marginal farmers. According to Bartholomen (1965) organic sources of N decay over several years, with small amount of N becoming available to plants each year. For again organic N addition, again approximately half of the N is mineralized (becomes plant available) in the first year but this release occurs gradually during the growing season. De Data and Hundle (1984) reported that incorporation of organic matter in the soil improves its structure through increases in aggregation, which influence tillage properties, crusting, temperature variation and root penetration favorably. Ibrahim et al., 1993 conducted an experiment on wheat crop. Treatments including control, FYM (3% of soil) and NPK (100-50-50 mg/kg) were tested with and without alternate irrigation of 0.3% culture solution of EM. Grain and straw yield increase in all treatments with the addition of EM. The increase in grain yield due to the application of EM were 18.1% in original soil 10.3% in FYM and 1.3% in NPK treated soil. The trend in straw yield increase was quite similar to the grain yield. Haq et al., 2002 reported that integration of fertilizer with organic resources inoculated with effective microorganisms gave almost similar yield of wheat and cotton with the application of recommended fertilizers and the integration helped to improve soil quality.

Material and Methods:

The research work was conducted in the Dept. of Soil Science, University of Agriculture, Faisalabad during the year 2000-2001. Prior to the conduct of experiments, representative soil samples were taken from the 0-20cm depth and were analyzed for general assessment of different physical and chemical characteristics. Experimental field were irrigated with canal water having ECe of 0.35 ds/m, SAR= 0.19 (mmol/L)½ and RSC was nil. The objective of the study was to integrate the organic and inorganic sources of the nutrients to enrich soil quality and plant growth. According to the nature of the experiment the laboratory study was designed. In this study Farm Yard Manure was decomposed with the inoculum of effective microorganisms. These microorganisms were cultured in the Nature Farming Research Center, Dept. of Soil Science, University of Agriculture, Faisalabad. FYM was taken and inoculated with 1% inoculum of effective microorganisms. Incubation was given for 15 days. After the completion of incubation inoculated FYM was named as FYM-Biokasht (Hussain et al 2002). On the basis of the incubation this FYM-Biokasht was applied in field @ 20 t/ha to test on rice-wheat and cotton with respective control of organic and inorganic fertilizers (with ½ and full dose).

Field Experiments:
Rice-wheat and cotton wheat rotation was adopted with the following treatments.

T1 Control
T2 FYM @ 20 t /ha
T3 FYM-Biokasht @ 20 t / ha
T4 ½ NPK + FYM
T5 ½ NPK + FYM-Bioaksht
T6 NPK (Recommended Dose)

Experiments were laid out according to randomized complete block design (RCBD) with three repeats. FYM was applied in the experiment 15 days before plantation. Different doses of fertilizer application like N-P205-K2O were applied @ 120-90-60-Kg/ha for rice-wheat and 175-80-60 kg/ha for cotton crop and the fertilizer sources used were urea, diammoniun phosphate (DAP) and potassium sulfate. Phosphorus and potassium were applied to soil before the start of the experiment but N was applied in three steps (1st at sowing, 2nd at 1st irrigation and 3rd at the tillering stage). Standard procedures were followed to transplant rice seedling in the soil. Rice Variety Basmati-385 was sown as a test crop. Plant and soil samples were analyzed after the harvest of crop. During Rabbi Season, wheat variety Inqulab-91 was cultivated with the same treatments. FYM and FYM-Biokasht was again integrated with ½ and full dose of NPK. At the maturity of the crop yield parameters were recorded. After the harvest of crop again cotton crop was tested with the same treatments and the data was analyzed statistically.

Results and Discussion:

Paddy Yield

Data on paddy and straw yields are given in Table 01. Statistical analysis on average of three repeats showed that treatments factor as a whole and in combination (interaction with fertilizer) was significant for yield components with respect to control. Results of the experiments indicated that the maximum paddy yield was obtained in NPK treatment (4.45 t /ha) followed by ½ NPK-FYM Biokasht (3.56 t/ha), this might be due to readily available nutrition from mineral sources of the nutrients but the interaction of fertilizer with fermented FYM (FYM-Biokasht) also resulted better yield due to synergistic system of microbes that enhanced the efficiency and sustain supply of nutrients to plants throughout the growth period and at the same time, sustain soil fertility. Lal and Mathur (1988) also observed that combined application of organic and mineral sources of nutrients checked the deterioration effectively in the yield through integrated supply system. Haq (2002) reported that the integration of organic matter with fertilizer resulted better paddy yield. In case of straw yield, same trend was observed as in paddy yield.

Table 1. Paddy Yield (t/ha)

Treatments	Paddy Yield	Straw Yield
Control	2.45d	4.0d
FYM @ 20 t /ha	2.89c	4.67c
FYM-Biokasht @ 20 t /ha	3.34b	4.89c
½ NPK + FYM	3.34b	5.78b
½ NPK + FYM-Biokasht	3.56b	4.89c
NPK (Recommended)	4.45a	6.0a

Wheat Yield (t/ha)

Wheat grain and straw yield are presented in Table 2. Results of the experiment indicated that the grain yield of (2.26 t/ha) was obtained in NPK recommended application which was statically at Par with NPK + FYM-Biokasht. Same trend was observed in straw yield NPK> FYM> control. Results are supported by Sindhe and Ghosh (1971), Sharma (1991) and Ahmad (1998). Increase in yield due to FYM-Biokasht + ½ NPK might be due to continuous nutrient supply by beneficial microorganisms (Parr & Hornick 1995).

Table 2 Wheat Yield (t/ha)

Treatments	Grain Yield	Straw Yield
Control	1.87c	9.01d
FYM @ 20 t /ha	1.88c	9.06c
FYM-Biokasht @ 20 t /ha	1.93b	9.16b
½ NPK + FYM	2.03ab	9.44b
½ NPK + FYM-Biokasht	2.05ab	10.44ab
NPK (Recommended)	2.26a	10.91a

Seed Cotton Yield

Data regarding seed cotton yield are presented in Table 03. Results of the experiments indicated that the maximum seed cotton yield was obtained in recommended NPK treatment and was statiscally at par with ½ NPK + FYM-Biokasht treatment. Trend of yield was NPK. = ½ NPK+FYM-Biokasht, > ½ NPK + FYM > FYM> Control. Increase in yield due to the integration of fertilizer with Biokasht might be due to the microbial activity of beneficial microorganisms, which improved the quality of soil. Results were supported by Haq (1997) and Jamil (1998).

Treatments	Seed Cotton Yield
Control	376.96d
FYM @ 20 t /ha	446.26c
FYM-Biokasht @ 20 t /ha	486.72b
½ NPK + FYM	491.60b
½ NPK + FYM-Biokasht	518.42a
NPK (Recommended)	533.87a

Conclusion:

Technology of Effective Microorganisms has great advantage in growing rice based cropping system. Our innovation of Fermenter System, and EM-Biokasht making has emerged as elements of change in the paradigm shift of high impact agriculture into nature / organic farming. The detail of EM-Technology are as follows:

Application of EM in Agriculture

1-Bioaab:

It has tremendous power to compost through fermentation process, all kinds of crop residues, green manures, animal manures, poultry manures, sugarcane filter cake and any biodegradable material like Municipal Solid Waste into a high quality bio-fertilizer in a few days. Bioaab is kept in the room or under shade and the lid must be closed. Avoid placing it under the sun. It could be used up to one year or as long as there is no bad smell.

Preparation of "Extended Bioaab":

To extend one liter "Basic Bioaab" (the one you purchased from us) into Extended Bioaab (the one you shall prepare yourself), take about a 30 liter capacity plastic can and clean it thoroughly. Add 20 liter clean water into it. Add one liter molasses into the can and mix with water by shaking. Now add one liter basic Bioaab in the can. Shake well and close the lid and let the can stay at room temperature (25 °C) for three days. You can open the lid every 24 hours to release gas. Now you have prepared yourself, 22 liters of extended Bioaab which is as powerful as the basic Bioaab you purchased from us. Thus the cost of Extended or "Fazal" Bioaab comes out to be only **Rs. 2 per liter** and is the cheapest price of any agricultural material in the market. Kindly use this within 2 weeks or at least before it gives bad smell.

A. First and the most effective method of using Bioaab

The use of Bioaab through "FERMENTER SYSTEM"

The farmers of Pakistan usually store the manure of their animals along the roads leading out from their villages or on their fields. Such manures remain under the sun for a longtime due to which the nitrogen from the manure is lost as ammonia gas due to the oxidative decomposition of manure. On the contrary, if the same manure is added within a few days to the Fermenter the microbes present in Bioaab convert the manure into amino acids through the process of anaerobic fermentation. This fermented material keeps on going with each irrigation automatically to the field through Fermenter System and spreading the fermented slurry layer after layer in the field.

Fermenter System:

The act of mixing fertilizers in irrigation water is called biofertigation, whereas fermenter system is a method in which organic manures are fermented in a tank attached to the watercourse where a part of the irrigation water passes through it and enriches the irrigation water with organic nutrient sources.

Advantages of Fermenter System:

1- In the current system manures can only added before sowing the crop in Rabi and Kharif seasons whereas in Fermenter System, one can add manure at least 48 times in a year.
2- Equal distribution of fermented slurry of manures on the soil, layer after layer.
3- Increase in the efficiency of chemical fertilizer while decrease in their expenditure.
4- Increase in water holding capacity of soil to the extent that soil maintains moisture for a longer period. This almost doubles the efficiency of the canal water.
5- Self sufficiency and an easy access to the supply of nutrients to plants as the nutrients and microorganisms go to the field with each irrigation.
6- The quickest method of decomposing the crop residue and consequently lowering the C:N ratio.
7- The Fermenter System increases the organic matter in the soil thus improving physical, biological and chemical properties of the soil.
8- Saves expenses in human labor for transportation and spreading of the manure in the fields.
9- Huge quantities of manure are not needed.

a. Normal Fermenter Model
(A Fermenter is a low cost, on the farm, fertilizer factory)

The farmers who have more area and less animal manure, can get immediate benefits through Fermenter System by using even 1/4th of the animal manure required generally. For this purpose, build a cemented Fermenter (Tank) on the watercourse entering in your land or near the tubewell on your farm. Do not make earthen Fermenter as the nutrients and metabolites can be leached. At the beginning and end point of the Fermenter make a one-foot gate (Nakka) as inlet and outlet for water. Also make a control gate in the main watercourse between these two gates, to regulate the desired flow of water through the fermenter and build a wall one foot before outlet gate, having four openings of size 1½ x 1½ ft. underneath to facilitate more passage to slurry. **Such**

partition wall can also be built in the corner of outlet gate with just 2 pillers underneath and the lintel on it. Another alternative is to put 1½ ft high complete lintel under the wall for clean passage of slurry. The wall is necessary to force the slurry due to pressure through these openings. Now add some water and then FYM, PM or SFC alone or in combination up to 3½ feet depth and fill the Fermenter with water and mix these well by a light weight bamboo with iron bar at one end (Trangli), break clods and add 200 liters of extended Bioaab (for the first time) prepared from 10 liters of basic Bioaab, mix it well. To provide Bioaab constantly, place a drum with tap beside the Fermenter and pour into it Bioaab, molasses and water at the ratio of (1:1:20) and culture for 3 days so that extended Bioaab can be provided through tap into the Fermenter, when needed. Add extended Bioaab @ 22 liter per acre per irrigation into the Fermenter preferably 5-6 days before irrigation after you had added some more manure. Repeat this process every week.

To manage salt affected soils and /or using brackish water for crop production use PM and SFC both in the Fermenter. To complete the fermenting process, leave this culture for 5-6 days. For better results add 100 kg chopped green fodder or grass every week in Fermenter. Now irrigate through this Fermenter after seven days. Only 1/10th of water will pass automatically through the Fermenter while the rest will pass directly to field. Keep on stirring the Fermenter with " Trangli " after 1/2 hour's interval to make sure that slurry and not clean water passes through the fermenter. In this way irrigate 12½ acres. Add some manure in Fermenter after irrigation and add extended Bioaab at the rate of 22 liter/ acre/ irrigation into the Fermenter. Leave it till the next irrigation and repeat this process. If watercourses are earthen (Kacha), then build one Fermenter for every 12½ acres. If watercourses are cemented, more then one Fermenter can be built at the same place.

Size of Fermenter :
For 12½ acres the size of the fermenter is 20 feet in length, 10 feet in width and 5 feet in depth and the partition wall is 2 feet ahead of the last wall. For 25 acres make 2 such fermenters. If walls of 9 inch width are costly, you can make walls of 4 inch size, however, the partition wall shall remain of 9 inch size. Poor farmers may initially build an **EARTHEN FERMENTER** with 8 feet width and 20 feet length and a thick plastic of 20 ft X 34 ft can be spread in the fermenter base and on the walls. The walls may be slightly slanting. The plastic should be carefully attached with the sides and pressed on the top with bricks.
NOTE: The wall in the Fermenter with openings at the base, play an important role to push the slurry out with extra advantage of minimum shaking in Fermenter. Inlet and outlet gates should be constructed 6 inches above the bottom of the watercourse to prevent silt entering from the watercourse to the Fermenter. Fermenter is undoubtedly a fertilizer factory on your farm, which can tremendously improve the quality of your soil for a sustainable agriculture.

b. Super Fermenter Model
To get better results, continuously add manure and urine of animals through drain into the Fermenter if animals are made to stand on a sloopy platform near the Fermenter as shown in. If 2 ml Biovet per liter of drinking water is given to animals daily, there will be no bad smell from animal dung and urine due to the enhanced fermentation taking place in their stomach using Biovet. Their fresh dung that is not useable in crops immediately, can now be used safely through Fermenter system. Every week add 220 liters of extended Bioaab prepared from 10 liters

of Basic Bioaab, in the Fermenter. It becomes a SUPER FERMENTER. Moreover, add 100 kg of chopped green grass/fodder in Fermenter every week. Fermenter is a tested and highly successful innovation. Many countries have approved it due to less labor cost and better use of animal dung. Through super Fermenter, dung and urine can be provided to crops in a short time by automatic system. The urine of animals is very rich in potassium. It is a highly effective method for all kinds of crops, vegetables, orchards, forests, fish, etc.

B. Second Method of using Bioaab
Conversion of Manures into Biokasht (Biokhad)
Spray 1% solution of Bioaab, on available organic matter resources (farmyard manure, poultry manure, Sugarcane Filter Cake, biodegradable garbage, crop residues etc.). Mix it well and maintain temperature at 30 ºC and moisture at 30-40%. To prepare 1% solution take the required drum and add:

1. Water = 100 liters
2. Molasses = 1 kg (add in water before adding Bioaab and make solution)
3. Bioaab = 1 liter

After preparing, one can use this extended culture as soon as possible. Approximately 400 liters of extended Bioaab will be required to prepare Bio fertilizer from one trolly or one tonne dry manure, (mixture of different kinds of manures make good fertilizer). Mix culture solution in manure thoroughly and make a ball by pressing the inoculated material in hand. If the ball shatters when thrown on the ground then make a heap under shade in summer and outside in winter if possible. At this stage there is about 30-40 % moister in the material. If it is too wet, add more solid material and if it is too dry, add extended Bioaab in it. Check the temperature after 3 days, if temperature is more than 45 °C (burn feeling to hand) spread it, cool and cover again. After 10 days in summer and around 15 days in winter, it will be converted into Biokasht (Fermented Manure). For quick preparation, use 5 liter Bioaab, 5 liter molasses and 100 liter of water and incubate manure for 7 days only. Now it is ready to be used in Fermenter or directly in the field @ 2-3 trolleys per acre or 10 t/ha before sowing of crops. (Use combination of FYM, PM, SFC and crop residues for better results. In case Biokasht is needed urgently, use 10L Bioaab + 10 liter molasses and 100 L water and incubate the manure for 3 days only. Biokasht of SFC is much more effective for soil fertility improvement as it contains about 2 % Nitrogen, 4% Phosphorus Pentaoxide, (P2O5), 0.8% Potassium Oxide (K2O), 6% Sulphur, 1 % Sugar and other micro nutrients that are important for crop growth along with 30% organic carbon. The author has written several requests to 78 Sugar Mills of Pakistan to give free SFC to all their sugarcane growers who have constructed Fermenters or can prepare Biokasht as this will increase the quality / productivity of soil. The sugarcane thus grown will have lesser water contents and the juice will concentrate which will not only make the sugarcane heavy but also increase sugar percentage in the cane irrespective of variety grown. Most of the sugar mills have responded to our request and have arranged my lectures to the growers and are also giving SFC free to their growers. Some sugar mills have even extended loans to build Fermenters. To mention a few are, Shah Taj, Patokee, Kanjwani, Kamalia, and Noon Sugar Mills in Punjab and almost all in Sindh Province with Khairpur Sugar Mills as the most cooperative and is growing sugarcane on barren lands with SFC-Biokasht and factory waste water and brackish tubewell water only, using EM-Technology.

In irrigated areas, add prepared Biokasht in soil before plantation of crops @ 20t/ha. For plantation of fruit trees use Biokasht (5% of pit soil) in pit. EM enters in big particles of manure and can live for a longer time inspite of less water. Use of Biokasht @ 2-3 trolleys for every crop and use of Fermenter water readily increase the soil fertility as well as yield of crops. It has been observed that the Fermenter water can be used after 24 hours if Biokasht is used instead of simple manure in the Fermenter.
For Rainfed Areas, Biokasht should be stored near the field and should be added to the field as soon as the rain comes. The process of soil fertility build up shall start if this process is continued. Experiments have shown that if Biokasht instead of simple manure is added to the Fermenter then it can be used immediately. It is advised that manures should be stored only after treating it with Bioaab or else nitrogen may be lost. It is recommend that for making Biokasht, at least a brick mounted platform must be made with one foot cemented wall and a hump for trolley so that rain may not washout the manure extract.

C. Third way of using Bioaab

In the absence of fermenter, add animal manure or poultry manure or sugarcane filter cake or blend of the three @ 4 tractor trolleys at least 7 days before planting any crop. Add 22 liters of extended Bioaab drop by drop in the soaking irrigation water. This method is the least effective method of using Bioaab because due to the expure to oxygen, the photosynthetic bacteria becomes slow in action as it is strictly anaerobic. Therefore, it is better to use Biokasht while, Fermenter System is the best approach as one trolley of manure added through Fermenter is equal to 3 trolleys of dried and unfermented manure added to the field.

2-Biopride:

The Nature Farming Research Center has developed a new microbial culture containing a very important photosynthetic bacteria which can utilize 80% of the sunlight (which could not be utilized by green plants as food) and can convert the organic matter present in the soil into amino acids. Thus the results have shown remarkable yield increase in sugarcane, maize, potato, fodder, gardens and vegetables.

Method of use:

1- At least 15 liters of Biopride per acre per crop should be added with the soaking and 5 liter with the first irrigation (total 20 liter per crop/acre) by just dripping into the water. Make sure that you have added any kind of manure in the soil for quick results.
2- One liter of Biopride plus one liter of Bioaab added to 400 liters of water can be sprayed on all crops. The easy formula is as follows:

Volume of spray tank in liters x 3 = ml of material

For example

16 liter x 3 = 48 ml of spray

Take 48 ml from the mixture of (Biopride + Bioaab) in the 16 liter tank and fill the tank with clean water and spray on the crop, when finished, may repeat similarly until the desired area is sprayed.

3-Biocontrol:

This is a botanical pesticide prepared by extracting alkaloids from various medicinal plants. The mode of action is the stomach killing of insect/pests.
How to spray: As soon as an attack of insects/pests is suspected, spray the crop with Biocontrol at the rate of 1 liter diluted to 400 times with water, which means 3 x volume of spray tank in liter = ml of biocontrol added to spray tank full of water. In case the attack is serious, spray biocontrol once every day for three consecutive days. For vegetables and fruits, pre-attack sprays of Biocontrol are also recommended to avoid any sudden attack of insects / pests. Biocontrol can also be added by dripping one liter per acre in irrigation water for control of borers and other root diseases.

Technology to amend the Brackish Tubewell Water for irrigation through

"BIOGENERATOR SYSTEM"
It is a tested technology, highly economical and make it easy to use brackish tubewell water having salts more then 1000 ppm. Such water must pass through Fermenter System whereas tubewell water having Sodium Adsorption Ratio (SAR) more then 10 (m moles/L)½ and/or Residual Sodium Carbonate (RSC) more than 2.5 me/L or any one of these, must have Biogenerator System attached to the tubewell and even with canal water when the soil are sodic or saline- sodic in nature.

Such brackish water have high amounts of sodium bicarbonates which dispurses the clay, clog the pores and makes the soil hard, therefore, the sodium ions must be replaced either by calcium from gypsum (CaSO4 2H2O) or hydrogen ions from sulfuric acid (H2 SO4). Pure gypsum is not easily available and also its solubility is very less whereas sulfuric acid is costly, with impurities and very difficult to handle by the farm labor. Nature Farming Research Center has developed Biogenerator System in which a part of the brackish water is converted into organic acids as given below.

How to prepare one thousand liters of acid from brackish water

One can build three cemented tanks with 1000 liters capacity each, adjacent to the tubewell water tank so that tubewell water can be added by pipe into these tanks. These tanks must be build one foot above the watercourse level so that acid can flow into the watercourse by gravity. An alternative is to purchase 3 (Capsule type) plastic tanks of 1000 L capacity each. Small Farmers can use 500 L capacity tanks. These plastic tanks can also be used for canal water biogenerator as these can be filled manually where as even cemented tanks can be made underground along with Fermenter System where acid can be picked manually by bucket and added to Fermenter or watercourse.
Take a 50 liter capacity plastic drum. Add two liters basic Bioaab and two liters molasses in the drum and fill half the drum with water. Mix thoroughly and then add the remaining water to fill the drum. Close the lid and let it stay in room for 3 days. This is 50 liters of Extended Bioaab. Put this extended 50 liters Bioaab into one of the cemented tank or plastic tank. Add 50 liters of more molasses in the tank by mixing in water thoroughly. Now fill the whole tank with tubewell water and let it stay for six days. The remaining two cement or plastic tanks can also be cultured similarly. This is Supra Extended Bioaab with pH close to 4. Drip this acid into the water

channel during irrigation. This shall make the soil porous and soft as well as much better for growing crops.
In case you don't have Biogenerator as yet than add every week 220 liters of extended Bioaab into the Fermenter regularly.

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How to Manage Pests and Diseases in Organic Rice Field?

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Introduction

Rice is an important crop cultivated in Asia. The region contributes nearly 90% of the world's production. Since 2004 has been declared as 'International Rice Year', it attracts special attraction of the world's scientific community. Transition from chemical farming to organic farming is highly challenging, as we need to maintain the productivity levels without using the chemical inputs. It becomes more challenging when it comes to the management of pests and diseases once they have developed multiple level of resistance due to overuse of synthetic pesticides in the past. Therefore, control with limited bioproducts available in the market is highly challenging. In the present paper, an attempt has been made to provide a systematic guidance for managing the pest and disease population below Economic Threshold Level (ETL).

Nursery Preparation

Plan early sowing to evade problem of insects and pests species. About 1000m2 area is sufficient for one hectare planting. The soil is puddled by two to three runs of puddler. After one or two days of puddling divide the nursery area into narrow beds of one meter width and any conventional length, depending on the slope. Construct the drainage channels of 30cm width in between the seed beds. Apply oil cakes such as neem, pongamia, mustard etc. either alone or in combination @ 150 kg/ha.

Major Pests of Rice

Insect pests

Brown planthopper (Nilaparvata lugens)
Gallmidge (Orseolia oryzae)
Yellow stembore (Scircophaga incertulas)
Leaf folder (Cnaphalocrosis medinalis)
White backed planthopper (Sogatella furcifera)
Gundhi bug (Leptocoriza spp.)

Diseases
Blast (Pyricularia oryzae)
Sheath blight (Rhizoctonia solani)
Bacterial leaf blight (Xanthomonas campestris pv. Oryzae)
Brown spot [Cocliobolus miyabenus]
False smut (Ustilaginoidea virens)

Weeds
Echinochloa spp.
Cyperus spp.

Rodents
Smaller bandicoot (Bendicota bengalensis)
Soft furred field rat (Millardia meltada)
Field mice (Muss spp.)

Selection of Variety

The insect and disease management starts right from the stage of selection of right variety seed. Although, it is difficult to get a variety, which is resistant to all pest and diseases. However, it would be appropriate to select the variety, which is more resistant to the most damaging pest and disease occurring in that particular area. A list of resistant varieties available in India is given in Table 1.

Table 1. Varieties resistant / tolerant to various insect pests releases in India

Insect Pest	Central release	State release
Stem borer	Rama, Sasyasree	Aaket (UP), Pajyur (TN), Deepti (MP), Vikas (AP)
Gall Midge (GM)	IR 36	Kakatiya, Surekha, Phalguna, Dhanya Lakshmi, Pothana, Vibhava, Divya, Abhaya (AP), Asha, Usha, Samaridhi, Abhaya, Ruchi (MP), Shakti, Samalei, Pratap, Daya, Neela, Sarsa, Udaya, Lalat, Tara, Ksnira (Orrisa), Vikram, Phalguna, Mahaveera, Karna (Kar), Rajendradhan 202 (Bihar), Kunti (WB), MDU (TN)
Brown Plant Hoppers (BPH)	Manasarovar	Jyoti, Bhadra, Pavizham, Karthika, Aruna, Makom, Remya, Kanaka (Kerala), Co.42 (TN), Bharatidasan (Pondichery), Sonasali, Nagarjuna, Vajram Chaitanya, Pratibha, Krishnaveni, Chandana (AP)
Green Leaf Hopper (GLH)	IR 20, Vani	Vikramarya (AP)

Source : Adopted from DPPQT, Govt. of India

Seed Treatment

Rice seed should be treated with Trichoderma virdie in order to keep the plant disease free and healthy. Trichoderma virdie releases many antifungal compounds which help the seed and seedling to fight with fungal pathogens present in the soil and seeds. Trichoderma also releases many growth promoting substances thus promotes the growth of the rice plants.

Soak 25 Kg seeds in 25 L of water containing 2.5 g of Streptocylin for 24hrs. Drain out the water, then give seed coating of Trichoderma. Dissolve 125 g Trichoderma powder in 25 L of water. Treat seeds with solution by mixing. Spread the seeds after 5-10 minutes and cover them with wet gunny bags. Sprinkle water 2-3 times so that seeds get germinate after 2-3 days. Sow the germinated seeds in the nursery as per normal practice. Nursery is irrigated after emergence of seedlings, take care that the seedlings are not submerged.

Field Preparation

2-3 ploughing followed by irrigation and 2-3 puddling are done to prepare the field for transplanting of rice seedling. Apply oil cakes such as neem, pongamia, mustard etc. either alone or in combination @ 150 kg/ha.

Seedling Treatment

Prepare a solution of Trichoderma viridie formulation (1 kg) and dissolve in water sufficient enough to dip the roots of the seedlings to be transplanted in one hectare of field. Mix the solution properly and dip the seedling as shown in Figure 1. Remove the seedlings from the Trichoderma solution and transplant them in the field (Figure 1).

Figure 1. Treatment of rice seedlings with Trichoderma viride formulation

Transplanting

To be done when plantlets in nursery are at 4-6 leaf stage to 20-25 days old plantlets

b. Row to Row distance - 20cm
c. Plant to plant distance - 15cm
d. Field to be flooded with water (4-5 cm) during and after transplanting

Pest Monitoring

It is very important to make survey of a field to have an indication of the number, kind and severity of pest and disease problems present in order to assess the economically injuries levels. The Economic injury levels of major pests and diseases of rice are given in Table 2.

Pest and disease monitoring is very essential and must be adopted at regular intervals. Observations should be taken at weekly intervals for regular pest and disease monitoring. Five randomly fixed observation plots of one acre can be selected for making observations. Nets such as sweep-nets and water-pans can also be used to monitor the insect pest and bio-control agents populations. Light trap with 200 watts mercury lamp can also be used in night for insect pests population monitoring. Pheromone traps (5 traps per ha) have been found very useful in monitoring the population of stemborer moth. Rodents also critically injure the plants. Their population can be monitored by counting the number of burrows.

Table 2. Economic Threshold Levels (ETLs)

Crop stage and pest	Economic threshold levels
A. Nursery	
1. Green leaf hopper	1-2 insect/sq. mtr
2. Gallmidge	1 silver shoot (gall) sq. mtr
3. Stemborer	1 moth/1 egg mass/sq. mtr
4. Blast	5% disease saverity
B. Planting to pre-tillering	
1. Leaf loder	2 freshly damaged leaves/hill
2. Yellow stem borer	5% dead-hearts or one egg mass or one moth/sq. mtr
3. Gallmidge	1 gall/sq mtr in endemic areas or 5% affected tillers in non-endemic areas
4. Brown plant hoppers	5 to 10 insects/hill
5. Green leaf hoppers	10 insects/hill (in RTV endemic areas 21 insects/hill)
6. White backed plant hopper	10 insects/ hill
7. Rice hispa	2 adults or 2 damaged leaves / hill
C. Mid tillering	
1. Leaffolder	2 freshly damaged leaves / hill
2. Stemborer	10% dead heart or 1 egg mass or one egg mass/sq. mtr
3. Gallmidge	5% silver shoots
4. Brown plant hopper	10 insects/hill
5. Green leaf hopper	10-20 insects/hill
6. Hispa	2 adults or 2 damaged leaves/hill
7. Blast	Light (5-10% disease severity)
8. Bacterial leaf blight	Light (2 to 5% disease severity)
9. Sheath blight	10% or more affected tillers
10. Tungro	1 affected hill/sq. mtr
D. Panicle initiation to booting	
1. Stem borer	1 egg mass/moth sq. mtr
2. Leaf folder	2 freshly damaged leaves/hill
3. Green Leafhopper	20 insects/hill
4. Brown plant hoppers	15 to 20 insects / hill
5. White backed plant hoppers	15 to 20 insects / hill
6. Blast	5 to 10% leaf area damaged
7. Bacterial leaf blight	Light to moderate (2-5% disease severity)
8. Sheath blight	10% or more tillers affected
E. Flowering and after	
1. Brown planthopper	25 to 30 insects/hill
2. Climbing cutworm	4-5 larvae/sq. mtr
3. Gundhi bug	1 or 2 bugs /hill
4. Blast	5 % leaf area damaged or 1 to 2 % neck infection
5. Sheath rot/brown spot/ slight panicle discolouration	2-5% tillers affected
6. Sheath blight	10% or more tillers affected

Source: Adopted from DPPQT, Govt. of India

Pest Management

A) Mechanical Practices
Mechanical control involves removal of eggs, larvae or diseased part manually on large scale. It is difficult to do the picking of the larvae from every plant. However, Use of rope in rice crop for dislodging caseworm and leaf folder larvae etc can be adopted effectively. Rice seedling tips can be clipped and infested plant parts can be destroyed. Egg masses and larvae of pests has been conventionally used in India for placement in bamboo cages for conservation of biocontrol agents.

B) Biological Control Practices

Conservation of Biocontrol Agents
Biocontrol agents such as Spiders, water bugs, mirids, damselflies, dragonflies, meadow grassphoppers, carabids, coccinellids, Apanteles, Tetrastichus, Telenomus, Trichogramma, Bracon hispae, Paltygaster orzae etc. should be conserved.

Their population can also be augmented by their multiplication and release in field. Augmentation release of Trichogramm japonicum @ 50, 000 ha/week for 6 weeks starting from 30 days of transplanting for lepidopterous pests have been found very effective

Application of Biopesticides
Botanicals preparation such as Neem, can be used effectively. Control of insects can be achieved by means other than causing rapid death. Plants produce compounds that may repel insect or may alter feeding behavior, growth, development and moulting process or may disrupt mating and oviposition that can be well utilized for pest management programs. The most promising botanicals for present and future use belong to families meliaceae, rutaceae, asteraceae, malvaceae, labiatae and canellaceae. The most commonly used plants as insecticide are pyrethrums from Chrysanthemum cinerariaefolium (Compositae), rotenoids from the genera Derris, Lonchocarpus, Tephrosia and Mundulea (Leguminosae), nicotinoids from Nicotiana species (Solanacae), Triterpenoids from Azadirachta indica (Meliaceae) and alkaloids from Sabadilla. All of them, particularly Neem have been found effective against several pests which include rice cutworm, diamond backmoth, rice brown plant hopper, rice green leafhopper, tobacco caterpillar and several species of aphids and mites.

Installation of Pheromone Traps

Pheromone traps can be tied on a stick. Five traps are required for one hectare of land. Put the lure inside the traps. Monitor the traps daily to monitor the incident of flies. Presence of flies in the trap necessitates the application of Neem spray and Trichoderma eggs cards. Change the lure one more time after 20 days.

a b

Figure 2. a) Pheromone traps b) Pheromone traps in field

Neem Spray

Spray neem bio-pesticide (1500 ppm Aza) at the rate of 1L formulations in 500L of water per hectare. First spray is done approximately after 50 days of transplantation. Second spray can be done after 80 days of transplantation of the seedlings.

Figure 3. Neem spray being applied in rice field

Trichogramma card application

Apply Trichoderma japonicum at the rate of 5 cards per hectare. Cut the egg cards with the help of scissors. Pin the card on the rice plant with the help of stapler. After 2-3 days, larvae will start hatching out the cards. Monitoring of the egg cards for the larval hatching is very important.

Application of the egg cards should be done at least a week after neem spray. Similarly spray of neem should be done at least a week after putting the egg cards.

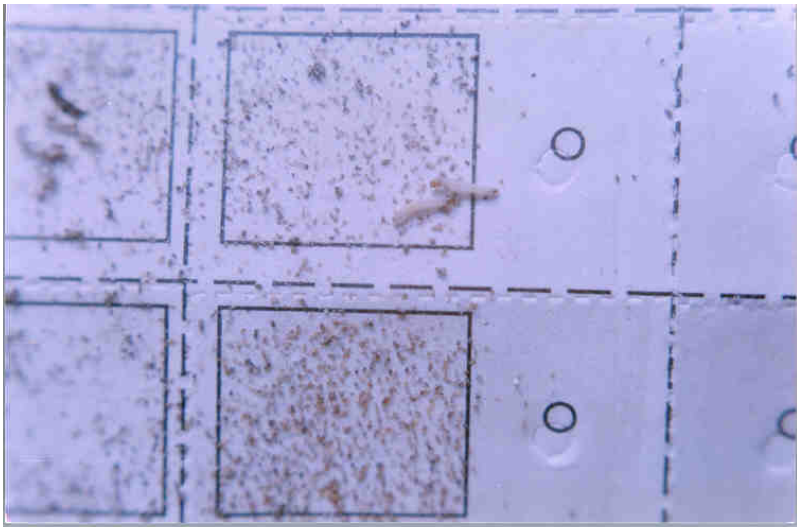


Figure 4. *Trichoderma* egg cards

Weeds Control
Do manual weeding as and when required.

Biopesticides Works Effectively

Timely application of biopesticides of proven quality and careful monitoring of the field can not only check the population of the pests and diseases but can also improve the yields as compared to chemical mode of pest control. Results of field trials conducted at five villages Salehpur, Thaska, Uttamwala, Kathgarh and Dhanaura of the Yamunanagar district in Haryana, (India) by TERI substantiate this further. Three different packages, viz. biological control measures, chemical control measures and farmer-practices based control measures, were demonstrated (over one acre of area/module/village) for raising paddy crop. Constant monitoring and evaluation was done from time to time and actions were taken accordingly.

No major disease was recorded in the biologically treated plots. The treatment with streptocyclin and Trichoderma helped in prevention of diseases. Neem formulation at the rate of 500 ml in 300 litres of water (two sprays at 15 - day intervals) along with the application of Trichogramma japonicum cards (2 cards were applied thrice at 12-day intervals) and one set of pheromone trap for one acre field (1 ha= 2.5 acres), proved very effective and provided more than 90% control over the sucking pests.

The yields were considerably different for the tested packages. The biological method of pest control gave the highest yield against farmer's methods and was found to have direct impact on the yield irrespective of any variety or village. The highest recorded yield with biological pest management method was 58.08 Q/ha (Quintal per hectare) in Thaska. The biological method when compared with the farmer-practices method enabled a significant increase of more than 20% in the yield for all the villages at an average of 28%(Figure-5). The increase ranged from 31.96 %(Kathgarh) to 22.23% (Salehpur) with the quantitative increase ranging from 12.17 to10.9 Q/ha. The income of the farmers could increase $ 142 per hectare (Figure-6) by incorporating biological pest-control methods. In case of chemical-based control, the maximum observed increase in income was $ 85 per hectare.

The biological-control method thus proved superior not only to the farmer's practices but also to the chemical-based-control method. The biological method in addition to being eco-friendly, also enhances farmers' income more than the chemical based method, thereby promising environmental and financial security. The potential of biological-control packages can be exploited to a much greater extent provided due guidance and support is given to the farmers. The farmers are receptive as, in some cases, they immediately switched to the biological-based control measures. The use of non-chemical and biological means would certainly reduce the load of pesticides on the environment, give us a safe food to consume and help to ensure a clean environment for a better future. Rice being an important crop in India, the biological module can be successfully utilized for the sustainable organic production of rice and can be extended to the basmati varieties as well.

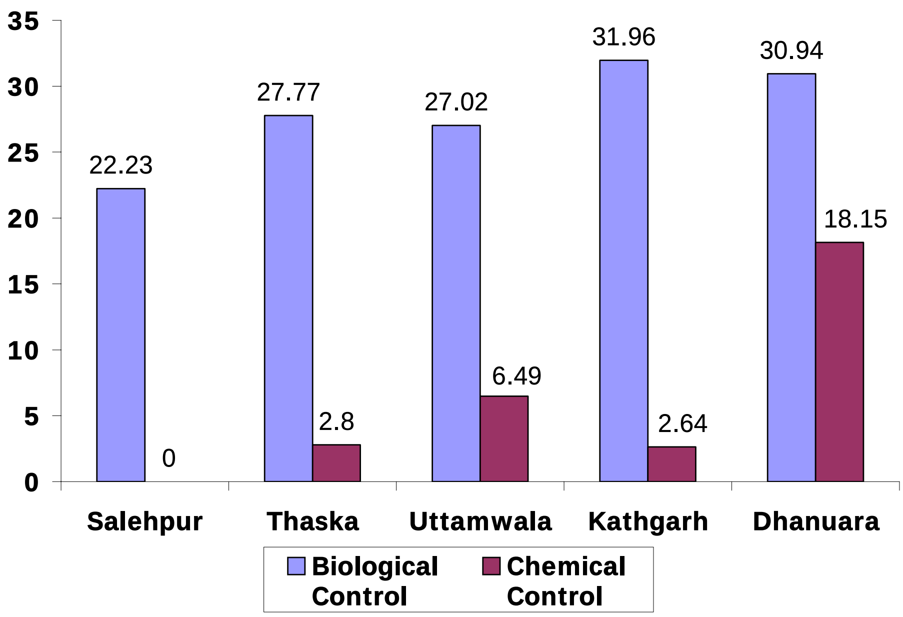
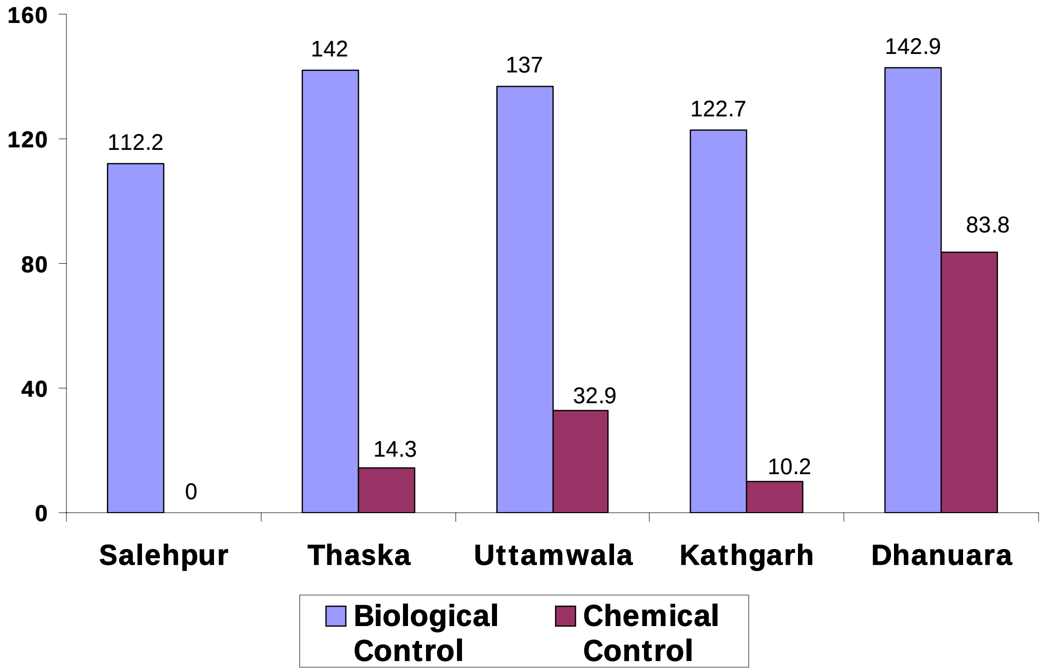


Figure 5. % Increase in yield of rice



Pest Control Schedule **Figure 6.** Increase in income ($/ha)

Based on the above experiments, Table 3 gives the control measures for the major pest and diseases of rice, which can be undertaken under organic production of rice.

Table 3. Pest control measures for rice

Pests	Biological Control
A) Weed Control	
Nursery	Manual
Field	2-3 hoeing after 3-4 weeks of sowing Weeding by wheel hand hoe
B) Insects	
1. Rice Root Weevil (July –September)	Neem at nursery
2. Leaf Folder (July –Oct)	Trichogramma japonicum + BT (if required)
3. Leaf and Plant Hopper	Neem spray
4. Stem Borer	Biotraps and Trichogramma japonicum
C) Diseases	Seed Treatment 0.1g strepocycline 1Kg seed in 1L water for 24hr then coat with Trichoderma paste. Seedling treatment with Trichoderma followed by foliar spray (if required).
D) Nematodes	Trichoderma viride seed treatment

Schedule for application of biological control measure are given in Table 4. This is a generalized table and can be modified as and when required.

Table 4. Schedule for biological control measures in rice

Time	Biological Control Agent	Application Rates
Pre-sowing	Seed treatment with Trichoderma	4-5g / Kg seed
Nursery – 25days	Neem 1500 ppm spray	1 L/ha
Seedling just before plantation	Root treatment with Trichoderma	1Kg/ha
Field – 30 days	Pheromone trap with lures, one replacement after 20 days	5 traps/ ha (1 lure/ trap)
Field – 50 days	Neem 1500 ppm spray	1L/ha
Field – 60 days	Trichogramma japonicum	5 cards / ha (≈ 1.5 lakh eggs)
Field – 70 days	Trichogramma japonicum	5 cards / ha
Field – 80 days	Neem 1500 ppm spray	1L/ha
Field – 100 days	Trichogramma japonicum	5 cards/ha

Conclusion

By adopting the above mentioned pest management practices we can provide effective plant protection coverage to rice crop growing under organic cultivation.

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BREEDING BASMATI RICE FOR ORGANIC FARMING SYSTEM

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Basmati rice means the rice varieties characterized by long slender rains having kernel length 6.61 mm and above, L/B ratio of 3.0 and above, high linear kernel elongation after cooking, medium to strong aroma, fluffiness, sweet in taste and intermediate amylose content (Table 1)(. The grains are pointed at both ends with gradual tapering at the end opposite to the germination end and has uniform breadth between the taperings. The basmati rice is also stated to be pearl of rice.

Basmati rice is being grown in the traditional areas of North and Northwestern parts of Indian subcontinent for many centuries. These superfine best quality of basmati rices are produced on either side of the Indus valley in India and Pakistan. The climatic conditions of this region (soil, temperature, rainfall) provide a congenial environment for the development of translucent grains and strong pleasant aroma. The main basmati growing districts of India and Pakistan are given in Table 2.

1. Agronomic Features of Basmati rice

The plant of basmati rice is tall and weak hence prone to lodging. Traditional basmati varieties are photoperiod sensitive and susceptible to most of the diseases and insect pests. Breakage percentage of long and extra long grain on milling is very high, giving lower head rice recovery. The typical aroma is evident at all stages of crop growth in almost all aerial parts of the plant. The principle aroma compound responsible for the unique flavour of basmati rice3 has been identified as 2-acetyle-1-pyroline.
All the basmati rice varieties are known to develop better aroma when exposed to cool weather conditions during ripening. Hence, basmati rice requires relatively cooler temperature (25°C day and 21°C night) during crop maturity for better retention of aroma. Basmati rices also show considerable location effect. Therefore, the best quality of basmati rice is grown in traditional basmati growing areas due to an interaction of genotype, soil and environmental factors.

2. Varieties

Several varieties of aromatic rices have been developed and released in India by CRVC and State Departments of Agriculture (Table 3). However, only few fulfill the norms of basmati quality. In fact the traditional varieties like Basmati 370, Type 3 (Dehradun basmati) and Taraori Basmati (Kernel Local/ HBC 19) are still the most preferred one for export purposes. The agronomic features and quality characteristics of these varieties is given in Table 4.
The research efforts for over two decades have resulted in the development and release of several high yielding dwarf basmati varieties like Pusa Basmati 1, Kasturi, Haryana Basmati 1, Pusa Sugandha 2, Pusa Sugandha 3, Vasumati, Yamini and Pant Sugandh Dhan 15. One basmati rice hybrid Pusa RH 10 has also been released in the country. These yielding semi-dwarf varieties give higher yields than the traditional varieties. However, they also have disease and insect problems. The farmers in traditional basmati growing areas are hesitant to adopt them. The

agronomic features and quality characteristics of some of the new varieties vis-à-vis traditional varieties is given in Table 5.

3. Export of Basmati Rice

Nearly two third of basmati rice produced in India is exported. The leading aromatic fine quality rices in export market, popularly known as basmati rices fetch a premium rice in the international markets for its three distinct quality features viz., pleasant aroma, superfine grain and extreme kernel elongation on cooking. Due to strict quality control norms fixed by Govt. of India recently (Jan, 2003) only 11 varieties have been approved for export. A brief description of these varieties is given in Table 6

4. Organic Basmati rice

The demand of the aromatic rices grown in this region may be further enhanced if grown under organic farming systems. Organic rice is an emerging concept and Uttaranchal has a bright scope for organic rice farming which is a common practice with the indigenous rice cultivars, particularly in those pockets, where subsistence farming still exists. The organic rice can be successfully grown under natural biological resources with organic manures alone because the soils are rice in fertility, high in organic carbon and moderate in phosphorus and potassium. Organic basmatic rice crop can be followed by organic crop of pulses/ forage/ oilseeds/ vegetables etc. IPM modules have already been worked out for organic basmatic rice farming and many farmers have already adopted these modules.

5.Breeding Strategies

5.1 Conventional breeding methods

5.1.1 Short term approach

As a short-term strategy the existing popular varieties should be tested under different modes of organic farming, taking the forms of fertilizer as environments. The trials should be repeated over years to find out the genotype x environment x year interaction. This will provide a scientific basis for the selection of stable genotypes over various forms of organic fertilizer. The most stable variety should be immediately multiplied and recommended for cultivation under organic farming over large environments. On the other hand any particular genotype giving better performance to a particular mode of organic farming can be recommended to that specific situation.

5.1.1 Long term approach

The stable genotypes selected through the short term evaluation programme should be involved in the hybridization programme. The hybridization may be done under high management conditions. The F1 generation can also be grown under high management condition.

However, from F2 onwards the “Bifurcated Selection” or “Parallel Selection” method as suggested by Srivastava et al. (1983) could be followed, where half of the F2 seed will be planted under organic mode and the rest half under the inorganic mode. Simultaneous selection for desirable single plants should be made under both the environments. The practice will continue till F5/F6 generation or till the progenies become uniform. The best uniform progenies selected from both the modes should be tested in replicated yield trials, only under organic mode taking the best genotype combination having wider adaptability to different forms of organic fertilizer. The evaluation period will work as conversion period for the genotypes selected from the inorganic environments. The seed of the best genotype should be multiplied and distributed to the farmers for cultivation.

5.2 Participatory breeding

Participatory approaches to crop improvement, in which farmers undertake full or partial responsibility for the development, evaluation and selection of cultivars, have been proposed as an alternative to formal plant breeding. It is expected to produce varieties fulfilling the needs of farmers with greater acceptability, particularly in marginal environments. Interaction between formally trained breeders and farmers that the breeding goals are appropriate and selection environments are representative of the factual on-farm situations. Farmers contribute with information on needs, selection criteria and constraints while the expertise of the breeders contributes towards the generation of variability, population management and designing of screening methods that can separate genetic from environmental effects. Various options for participatory breeding methods are given in Table 7.

Table 1 : Characteristics of Basmatic rice

Sl.No.	Parameters	Value
1.	De-hulling (%)	80 and above
2.	Milling (%)	65 and above
3.	Head rice recovery (%)	45 and above
4.	Milled kernel length	6.61 mm and above
5.	Milled kernel breadth	Maximum 2.0 mm
6.	Kernel L/B ratio	3.5 and above
7.	Cooked kernel length	12.0 mm and above
8.	Cooked kernel breadth	Note more than 2.4 mm
9.	Elongation ratio	1.80 and above
10.	Volume expansion ratio	3.0 and above
11.	Amylose content (%)	20-25
12.	Alkali spreading value	4-5
13.	Gel consistency	Medium to soft
14.	Water uptake per 100 g raw rice	250 ml and above
15.	Chalky kernels	Less than 10%
16	Aroma	Strong appealing

Table 2 : Major Basmati growing districts in India and Pakistan

Sl.No.	Parameters	Districts
India	Punjab	Amritsar, Gurdaspur, Kapurthala, Jalandhar, Patiala, Ropar, Nawan Shehar, Fatehgarh Sahib, Hoshiarpur.
	Uttaranchal	Dehradun, Nainital, Udham Singh Nagar, Haridwar
	Uttar Pradesh	Pilibhit, Saharanpur, Rampur, Bijnor, Moradabad, Muzaffarnagar, Gaziabad, Meerut, J.P. Nagar, Badaun, Bareilly
	Haryana	Karnal, Panipat, Kaithal, Kurukshetra, Jind, Ambala, Sonepat, Yamunanagar
Pakistan	Punjab	Gujranwala, Sheikhupura, Sialkot, Lahore, Kasur, Sahiwal, Bhawal Nagar
	Baluchistan	Nasirabad

Table 3 : High Yielding aromatic varieties released in India

IET No.	Variety	Percentage	Grain type	Duration	Year
1891	Sabarmati	TN1/ Basmati 3702	LS	125	1970
1892	Jamuna	TN1/ Basmati 3702	LS	120	1970
–	Improved Sarbati	Selection from Sabarmati	LS	135	1972
8580	Kasturi	Basmati 370/CR 88-17-1-5	LS	125	1989
10364	Pusa basmati 1	Pusa 150/ Karnal Local	LS	150	1989
10367	Haryana Basmati	Sona/ Basmati 370	LS	140	1991
15391	Vasumati	PR 109/ Pakistan Basmati 1	LS	133	2001
16310	Pua Sugandha 2	Pusa 1238-1/ Pusa 1238-81-6	LS	130	2001
16313	Pua Sugandha 3	Pusa 1238-1/ Pusa 1238-81-6	LS	130	2001
–	Pusa RH 10	Pusa 6A/ PRR 78	LS	130	2001
14720	Yamini	BR 4-10/ Pakistan Basmati	LS	150	2001
Bihar					
–	Sugandha	Pure line selection from Cuttack Basmati	LS	140	1983
–	Kamini	Pure line selection from Katarni rice	LS	135	1991
Gujrat					
–	Kolhapur	Local pure line selection	LS	140	1971
–	T3	Selection local type 3	LS	145	1973
–	GR 101	IR 8 / Pankhari 203	LS	130	1984
Himachal Pradesh					
8594	Himalaya 2	Imp. Sabarmati/ Ratna	LS	130	1982
Jammu and Kashmir					
11348	Ranbir Basmati	Selection from Basmati 370	LS	120	1994

Karnataka					
1906	Kusuma	Basmati 370/ TN1	LS	120	1969
13549	RPST –328	Selection from Basmati composite	LS	130	1992
Madhyapradesh					
3785	Madhuri	Jaya/ R 11	LS	115	1980
Maharashtra					
12897	Indrayani	Ambemohar 157 / IR 8	LS	132	1978
–	Ambica	MAU Sel –1	LS	120	1984
9214	Prabhavathi	Mutant of Ambemohar	LS	120	1984
–	SYE-2	–	LS	135	1985
11338	Pawana	IR 8/ Pusa 33	LS	120	1988
10651	Sakoli-7	TN 1/ Basmati 370	LS	130	1988
9296	SYE-ERI	Sonal/ SYE 44-3	LS	120	1990
Punjab					
7313	Punjab Basmati-1	Sona/ Basmati 370	LS	130	1982
13185	Basmati 385	TN1/ Basmati 370	LS	135	1992
14710	Basmati 386	Sel. From Pakistan Basmati	LS	135	1994
Rajasthan					
7028	BK 79	TN 1/ NP 130// Basmati 370	LS	130	1981
13549	RPST 328	Sel. From Basmati composite	LS	130	1992
–	Khushboo	Baran Basmati/Pusa 150	LS	130	1994
12601	Mahisugandha	BK 79/ Basmati 370	LS	130	1994
Tamilnadu					
7029	ADT 32	IR 20/ Pusa 33	LS	145	1972
–	Pusa 33	Imp. Sabarmati/ Ratna	LS	110	1975
13544	JJ 92	Sel. From dwarf Basmati	LS	080	1993
Uttar Pradesh					
15060	Hasan Sarai	Introduction from Iranian Basmati	LS	135	2000

Table 4 : Characters of Traditional Basmati Varieties

Particulars	Taroari Basmati	Basmati 370	Type 3
Plant characteristics			
Habit	Tall	Tall	Tall
Height (cm)	148	145	140
Days to flowering (fd)	120	115	95
Tillering (Sq.m.)	331	294	Good
Kernel characteristics			
Length (mm)	7.34	6.93	6.87
Breadth (mm)	1.73	1.86	1.93
Length/ Breadth	4.24	3.73	3.55
Colour	White, transluscent	White, transluscent	White, transluscent
Abdominal white	Absent/ voc.	Absent	Absent
Milling characteristics			

Hulling (%)	74.9	79.6	80.0
Milling (%)	63.0	67.9	75.0
Whole grain (%)	54.1	46.2	59.0
Cooking characteristics			
Alkali value	6.0	6.2	6.0
Water uptake (ml)	275	240	230
Volume expansion ration	4.8	4.0	12.5
Kernel elongation ratio after cooking	15.5	12.80	Elongated
Kernel elongation ratio	2.11	1.85	1.82
Amylose (%)	22.35	22.10	23.0
Aroma	Present	Present	Present
Yield (t/ha)	2.5	2.8	2.6

Table 5 : Quality and yield of high yielding dwarf basmati varieties is –vis traditional types

Quality trait	Pusa basmati 1	Kasturi	Haryana Basmati 1	Basmati 370	Taraori Basmati
Length (mm)	6.82	6.72	6.74	6.76	7.10
Breadth (mm)	1.73	1.73	1.65	1.76	1.78
Length/ Breadth	3.94	3.87	4.08	3.84	4.03
Colour	White	White	White	White	White
Abdominal white	A	A	A	A/OP	A/OP
Milling characteristics					
Hulling (%)	76.3	77.9	78.3	76.8	75.5
Milling (%)	67.7	71.8	71.3	69.0	68.5
Head rice (%)	44.2	61.9	44.7	46.0	45.5
Cooking characteristics					
Kernel length (mm)	13.23	11.6	11.46	12.72	13.30
Kernel elongation ratio	1.89	1.70	1.70	1.88	1.87
Aroma	MS	SS	MS	SS	SS
Amylose content (%)	27.14	19.0	21.77	19.10	20.11
Alkali value	5.81	3.0	6.57	4.45	5.27
Water uptake (ml)	228.00	345.00	338.00	221.00	205.00
Volume Expansion ratio	3.81	4.0	3.80	3.92	3.70
Yield and related traits					
Duration	150	100	140	145	150
Plant height (cm)	106	106	116	145	148
1000-gm weight (g)	21.5	21.5	19.0	22.9	24.4

Table 6: Basmati varieties approved for export by APEDA

Variety	IET No.	Year of release/ motification	Duration (days)	Average yield (q/ha)	Recommended
Traditional varieties (developed through selection)					
Basmati – 370	–	1973	135-140	25-30	Punjab
Basmati – 127	–	1973	140-145	20-25	Punjab
Type – 3	–	1979	130-135	30-35	Uttar Pradesh and Uttaranchal
Ranbir Basmati	11348	1994	125-130	30-35	Plains of Jammu
Basmati 386	14710	1994	135-140	30-35	Punjab
Taraori Basmati (HVC-19)	–	1996	140-145	20-25	Haryana
B. New varieties (developed through hybridization)					
Punjab Basmati	–	1992	125-130	35-38	Punjab
Dwarf Basmati					
Pusa Basmati 1	10364	1969	135-140	40-45	Punjab, Haryana, Delhi, Western U.P., Uttaranchal, Rajasthan
Kasturi	8580	1959	125-130	35-40	-do-
Haryana Basmati 1 (HKR228)	10367	1992	140-145	40-45	Haryana
Mani Sugandha	12601	1994	130-135	38-40	Rajasthan

Table 7 : A range of participation plant breeding methods

Sl. No.	Method	Application	Recommended
1.	Best advanced F7 or F8 lines given to farmers for testing. It is closet to participatory variety identification, since farmers are given nearly finished product	Easy to use across locations	Galt (1989) and Maurya et al. (1988)
2.	Early generation (F2) in farmers fields and other generations and procedures with plant breeder	Single location, specific traits	Thakur (1995)

3.	F3 onwards generations. Farmers and plant breeders' work together to select and identify the best material, plant breeders facilitate the process by giving advice on heritability and selection methods, and farmers select. Pre-release multiplication can take place in parallel to the participatory plant breeding. Release proposal prepared by plant breeder	It can be conducted at more than one location	Sthapit et al. (1995)
4.	Breeder gives F3 or F4 material to the farmers. All selection and advancement of generation left to farmers. At F7 or F8 or later stage breeders monitor diversity in farmers, fields. Breeders identity best material, by phenotypic appearance to the farmers, perceptions to enter in conventional field for pre-release multiplication.	Extremely easy to run selection schemes at many locations.	

<u>Source:</u> Dr. S. C. Mani Joint Director Research/ Professor Deptt. of Genetics & Plant Breading, College of Agiculture.

BIOPESTICIDES: A BOON TO AGRICULTURE

Biological control is a principle of cultural control of plant pathogens that primarily involves alteration of biotic and abiotic environments from one that favours disease/ pathogen to one that discourages accumulation of infective or parasitic material and reduces the activity of the pathogen. In broadly speaking, biological control could be defined as "any condition under which or practive whreby, survival and activity of a pathogen is reduced through the agency of any other living organism (except man himself) with the result that there is a reduction in the incidence of the disease caused by the pathogen. In simple words, biological control is the use of any organism (by man) for pathogen suppression.

Biological control as a strategy and philosophy for reducing crop losses from diseases is not new to agriculture. Even the earliest farmers practiced biological control by rotating their crops, burrowing disease infested crop residues and fertilizing with organic manures. These and many other traditional practices given effective disease control by allowing the time and opportunity for biological destruction of disease organisms. The challenge today is how to achieve effective measures for biological control of plant pathogens in agriculture where farmer must specialize with one or two crops, use minimal or no-till to same fuel and stop soil erosion, and where organic fertilizers are unavailable, inconvenient or too expansive. Pesticides are necessary at present but are not along term solution to crop health.

***<u>Source:</u> U.S. Singh, Shekhar Varshney and H.S. Chaube, Deptt. of Plant Pathology, College of Agriculture*.**

ORGANIC PEST MANAGEMENT: A NEW VISTA IN AGRICULTURE

IPM is the only resource to conserve biodiversity comprising beneficial pollinators, parasites and predators, to obtain high yields of crops through superior pest control.

One of these is the organic pest management based on Biolgoical Control i.e. based on biopesticides, which is considered to be environmentally benign, pest specific, safe to non-target organisms and leaves no toxic residues on the edible parts of the crop. In the last two decades, biological control ahs made a significant impact in pest management strategies and is further gaining increased attention and interest among those concerned with developing environmental friendly and safe Integrated Crop Management programmes, which have compatible approaches and tactics for pest management. It has been suggested that in the field of biological control, the cream has already been skimmed off and the point of diminishing returns has long since been reached. While the other school of thought says that in many instances only comparatively superficial studies have been made and quote a series of examples to show that the success achieved so far alone are sufficient to rebut the former school of thought. With the discovery and use of more and more of synthetic insecticides, resistances to these insecticides by a number of insect pests has been reported. Thus, the possibilities of biological control of several pests, even those where the chances of successful results seemed remote, become seemingly apparent. Thus, utilization of biopesticides undoubtedly going to play important role in organic farming for achieving healthy productivity fort the society.

Source: M.A. KHAN and VASUDHA GAUTAM Deptt. of Entomology, College of Agiculture.

Status and present Environment dimensions in Paddy Chain and potentials of Organic farming in India.

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ABASRACT : Switching to high yielding varieties, expensive labour costs, seed costs, irrigation mismanagement, fertilizers and pesticides, and that these chemicals actually cause more costs in production and environment pollution. The environmental dimensions of paddy production systems involve attention to soil health care, judicious water management, and the conservation of biodiversity, as well as to sanitation, environmental hygiene, primary health care, and education.

Many farmers in coastal Andhra Pradesh were dealt with blow when they were hit by cyclones accompanied by heavy rains and floods. In most of the cases the entire paddy crop was destroyed. In some cases farmers spent lot of money to pump water down to the farm to try and get all the water out. Due to continuous standing water in the paddy field the applied nutrients particularly chemical fertilizers leaches out. Low yields in rainfed low lands due to water stagnation and drainage congetion.partial submergence, deeper depth of water in the field and flooding causes poor establishment of seedlings and accumulation of toxic substances which impairs the growth and development of paddy (Ravi et all,2003).

The production and distribution of quality seeds is an important area requiring immediate attention of all concerned. Vigorous field testing should be mandatory before release of any variety or improved cultivar to avoid any risk to human health and environment. Many organizations have done well in adopting IPM through Farmer Field Schools(FFS) in implementing Sustainable paddy production through the participatory action research with farmers. Similar approach can be adopted by othee organizations through ToT and producing master trainees in order to spread the programme effectively. There are harmful impacts due to improper use of pesticides. Rice and fish production system is adversely affected by pesticide use in coastal Andhra Pradesh. Infact 20 years back fish and paddy were naturally growing in paddy fields. Conventional farmers apply chemicals at Milky stage and they suspect dangers of residues in the produce may be detrimental to both human beings and animals through fodder. The intensive use of pesticides leaves high level residues in soil and groundwater. Organic activity is an essential component of humification in improving soil structure is thereby impaired.

Methane production in paddy fields is insignificant even in the swampy and coastal areas, where farmers cultivate Paddy around the year.However, efforts should be made from Institutes and organizations to train its partners in understanding these specific issues and collaborative plans can be made to analyze the impacts with specialists. The chances of exposure to Organo chlorides, granules like carbofuran,phorate and many herbicides during transplanting and weeding by women is very high and hence the risks of dangers to their health is more.
Hybrid paddy may deplete nutrients very fast and crop require high amounts of nutrients and intern intensive areas would be further supplemented with high chemical fertilizers and chances of loosing soil physical structure and fertility is very high. Consumer preference is very low as the taste is not good . There is inadequate testing and regulations and therefore the labeling of all GMO and GMO by-products should be required by National law. GM paddy also don't have place in the consumer market.Hence,observing the live examples of failure of GM Cotton,definetely GM paddy research and development should hardly makes impact on overall situational changes in paddy chain itself.
Not enough safety measure like gloves and physical protectors to the eye, head and against dust allergy, provided to the workers in the mill. Methyl Bromide container fumigation for exportable Rice is a common method and potential scope should be identified whether some plant botanicals which are internationally accepted can be used for fumigation.
Organic paddy cultivation can link food production, income generation and environment protection requirements by making use of maximum local knowledge, biodiversity, on farm resources and alternate pest control methods and avoiding the use of agrochemicals. The approach is receiving with the withdrawal of government subsidies on agricultural inputs, the introduction of policy and growing concern of food safety and environmental protection.

INTRODUCTION

India is considered as one of the countries where rice originated and believed to have been there before the time of Buddha. It is vital for the food and livelihood security and consequently also for the economy of large section of the people in the country including farmers, the landless poor and people and communities involved in allied activities like livestock keeping, processing and small scale trade.

Rice thus forms an important part of the social and cultural life of the people.
India being a large country has various agro-climatic zones and Rice is grown in all the climatic zones ranging from rainfed conditions of the lateritic soils of plateau in semi-arid tropics of South India to irrigated north Indian Indo-Gangetic plains, which are rich in alluvial soils, from sea level and below sea level in the coastal areas to terraced fields in the Himalayas up to 2000 meters above mean sea level. Switching to high yielding varieties, expensive labour costs, seed costs, irrigation mismanagement, fertilizers and pesticides, and that these chemicals actually cause more costs in production and environment pollution.

The environmental dimensions of paddy production systems involve attention to soil health care, judicious water management, and the conservation of biodiversity, as well as to sanitation, environmental hygiene, primary health care, and education. This area needs attention because of the environment degradation, Low and unstable productivity, degradation of the natural resource base.

Cyclones and Floods:

Many farmers in coastal Andhra Pradesh were dealt with blow when they were hit by cyclones accompanied by heavy rains and floods. In most of the cases the entire paddy crop was destroyed. In some cases farmers spent lot of money to pump water down to the farm to try and get all the water out. Due to continuous standing water in the paddy field the applied nutrients particularly chemical fertilizers leaches out.

Some times heavy rains are occurring at the time of flowering and seed setting is affected leading to the sterility in seeds and at harvest time grains germinate on the panicle and lodging of the crop, which cause heavy loss to the farmers. To over come this situation some of the varieties should be evolved and also identified through participatory breeding technique having the dormancy for more than 15 days with all good agronomic characteristics.Paddy varieties that can with stand flood at least 20- 25 days and prolonged inundation should be identified and existing acclimatized varieties can be multiplied in large quantities. The agronomic traits should be erect stiff straw to with stand inundation, elongation during submersion, on-lodging after the floods and give good yield dormancy. A long duration variety (150-155days) with a period of dormancy is preferred and adjustment with planting dates for medium duration varieties should be considered.

Directorate of Rice Research, Hyderabad provided a low cost technology for Prevention of sprouting of seeds in water in cyclone hit area with salt water. This should be carried out by collecting the submerged paddy sheaves and immerse or dip only the panicles in the salt solution. One should not lose the time in immersing the panicles. Heap the sheaves as per the convenience. Thus, the seed germination is temporarily prevented for about 10-12 days.

Soil Degradation:

The coastal soils of TamilNadu and other places have varied characteristic problems, the most common being low-lying topography, inadequate drainage, fairly higher water table of poor quality water, moderate to heavy texture soils. These soils contain predominantly higher amounts of soluble salts of chloride and sulfate of sodium and magnesium and recorder low yields.Deep well systems at the coastal areas of Tanjavore delta of TamilNadu also invited salinity and many farmer’s left paddy cultivation.
Yields can be improved by growing salt resistant varieties like Hamilton,Getu,Malta and other recommended varities.In areas like Myladurai of Nagapattinam district, of higher salt content due to ingression of sea water, farmers can be practice of delayed transplanting with aged seedlings after adequate rain water accumulated and this fresh water diluted the salt concentration will be effective one. Of course the seedlings are raised elsewhere in salt free condition. Under this condition with the use of proper plant nutrition improves the grain yield potential of the crop.

Low yields in West Orissa are due to a number of adverse environmental and soil factors and their interactive effect. Lack of organic matter and low nitrogen content and poor availability of phosphorous, Zinc and iron are common features in uplands especially in pH calcareous soils. The upland paddy grown on laterite soils suffer nutritional disorders and the problems encountered are moderate to high acidity with iron and Aluminum toxicity. Most of the varieties are traditional and low yielding (Table.2.).Similarly low yields in rainfed low lands due to water stagnation and drainage congetion.partial submergence, deeper depth of water in the field and flooding causes poor establishment of seedlings and accumulation of toxic substances which impairs the growth and development of paddy (Ravi et all,2003).

Quality Seeds:

The production and distribution of quality seeds is an important area requiring immediate attention of all concerned. Vigorous field testing should be mandatory before release of any variety or improved cultivar to avoid any risk to human health and environment.In general the stock seeds distribution of paddy seeds including foundation, certified shares about 1.Public certified seeds: 15%, 2.Private companies: 8%, 3.Farmer to farmer exchange: 40%, 4.Rest by own, other farmers, relatives etc,: 37%. Hence, research and production at the notified farms should be redoubled in much faster face to achieve the goal of getting maximum certified seeds to all. Common paddy varieties grown in AP are given in the Table.3.

In Andhra Pradesh significant quantity of certified seeds (only15% certified seeds) of paddy has been produced for the last 5 years (Table.7.), however, it is insignificant interms of availability of certified seeds to the vast area under cultivation. Efforts from partner paddy seed producing cooperative societies to achieve maximum availability of certified seeds is essential.Hence,quality seeds helps in good crop improvement by protecting pests and inturn less use of pesticides and less or no environmental pollution. In coastal area seed production is difficult and what ever the seeds produced are mostly in dull colour due to periodic and frequent cyclones with a 66% RH and 35o temp and hence for long duration varieties most of the times farmers face problem in stock seeds in the seasons. In order to cover the huge gap and to serve remaining paddy farming community established co-operative societies should evolve some more plans to increase quality seed production and enhance the availability of stock seeds.Cooperatives should closely work with farmers in selecting some of the best varieties which can be suitable to Telanmgana region and hence participatory plant breeding techniques could be adopted.Cooperatives also should work in technological aspects particularly in identifying and selecting lines which are tolerant to pests and diseases.hence,pesticicde loads also can be reduced. Hence, quality seeds having resistance to pests, tolerance, drought tolerance, and other biotic and abiotic stresses will greatly helps in environmental protection by avoiding the excessive use of chemical fertilizers, pesticides and other environmental stresses.

Enough importance has to be given from Tamil nadu state seed corporation in meeting the certified seed requirement to the farmers. The ratio of availability of certified seeds is very less (Public certified seeds: 15%, Private companies: 8%, Farmer to farmer exchange: 40%, Rest by own, other farmers, relatives etc, 37%.Commonly grown and distribution of certified seeds is given in the Table.4.

However, there is an enormous scope to improve the quantity of certified seeds by the corporation.LEISA network and MSSRF are conserving many traditional varieties and trials have been taken with farmers.MSSRF also working with western Orissa farmers with biodiversity and conservation of few scented and traditional, varieties.

Water management:
Water management includes both irrigation and drainage. Removal of water logging conditions is important in maintaining soil normal fertility status .Uniform levelling of field and providing proper drainage are most essential for an effective water management. This facilitates good tillering in the crop, increase efficiency of nutrients use by plants and helps to reduce weed population. Maintain less than 1 cm during nursery and early transplanting stage and 2 cm throughout the growing season. Drain out water before any top dressing is given and let in water 24 hours later. depending on the soil type, drain out water 15-20 days after 50% flowering. This ensures fast ripening of the grains. This also helps in quick hardening of the soil and facilitates for harvesting.

Powdered neem cake 30 kg: 100kg urea for top dressing also prevents the percolation of nitrogen and made available to the plants.Donot flood the field in the command or tanksoureced irrigation. Alternate drying and wetting the fields saves lot of water and this judicial method of water management helps Brown Plant Hopper (BPH) management in coastal area and enhances the yield level very significantly with an increased area brought under cultivation. The efficient management of water also helps the multiplication of useful microorganisms in paddy ecosystem and inturn helps in solubilization of nutrients and made available to plants.

Water Use, Allocation and Paddy planning scheme at dams in command areas:

- estimate water available in the Lake based on water balance and water holding capacity
- Identify stakeholder groups relating to water use by PRA exercises.
- determine water use by different stakeholder groups in qualitative and quantitative terms.
- identification of regulatory measures/legal obligations with respect to allocation of water.
- estimate quantity of water for different uses like power generation, wildlife conservation, sustainable fisheries development and maintaining flora and fauna particularly endangered species

The environmental impacts of the existing hydrological structures and the interventions if implemented under the projects will be thoroughly examined by carrying out environmental impact assessment studies. Based on the data collected and critical evaluation of various parameters, operation policies for water management will be evolved.

RELEVANCE OF INTEGRATED PEST MANAGEMENT(IPM):

Intensification of IPM activities to provide safe food and to reduce adverse health impacts among rural women particularly in command and delta paddy growing areas of these study states. Common pests in paddy are BPH, Nilaparvatha lugens, Stem borer, Scirtophaga incertulas, Sheath blight, Rhizoctonia solani, blast, Pyricularia oryzae and Leaf Yellowing (Tungro) has to be managed in an integrated way in a bio-intensive manner by using biological control as a conservation technique and this can be blended with plant botanicals.Hence, bio-intensive IPM can be recommended.

Many organizations have done well in adopting IPM through Farmer Field Schools(FFS) in implementing Sustainable paddy production through the participatory action research with farmers. Similar approach can be adopted by othee organizations through ToT and producing master trainees in order to spread the programme effectively.

Imparting new technical skills through learning by doing for both men and women at the village level; promoting the development and dissemination of ecotechnologies at the production and post harvest phases of paddy cultivation, with special attention to ill effects of pesticides and chemicals and economics related to environmental impacts; improving post harvest technologies including proper drying techniques to keep optimum moisture levels, growing green manuring crops like Diancha, pongamiaa, glyrecidia, Sesbania and storage and storage pests management through plant botanicals like neem leaves etc, and efficient transportation and delivery systems can be made.

Pesticides and dangers of residues in the produce:

A variety of insecticides, fungicides, rodenticides and herbicides (Endosulpon, Monocrotophos , Carboryl, Quinolphos,Chloropyriphos,Ekalux,Carbofuran,Metacid,Bavistin,Contof,Tilt) are used in Andhra Pradesh both as mono and in cocktails list of commonly used pesticides and the consumption pattern is given in the Table.6.

Consumption of pesticides has drastically decreased over the last few years, However a detailed study involving various new chemical molecules introduction, their efficacy interms of spectrum of activities whether the concentration of active ingredient is really deuced or the quantity of the pesticides has been reduced.Deaprtment of Agriculture has demonstrated a good number of IPM farmer field schools (FFS) and claims in the reduction of pesticides. It also created resource persons in IPM in paddy through season long training programmes (SLTP) supported by FAO and UNDP and will be useful in spread of Paddy IPM in the state.

There are harmful impacts due to improper use of pesticides. Rice and fish production system is adversely affected by pesticide use in coastal Andhra Pradesh. Infact 20 years back fish and paddy were naturally growing in paddy fields. Conventional farmers apply chemicals at Milky stage and they suspect dangers of residues in the produce may be detrimental to both human beings and animals through fodder.

Many of the pesticides may remain on the crop for some time after application. It is very relevant with spraying at milky stage of the crop in Godavari command area. Good paddy production system aim of minimizing pesticide noxious effects on humans, animals and the environment include: use of less persistence and Eco friendly pesticides; choosing a formulation which combines maximum efficiency of pesticide with minimum risk; applying on the target pest minimum amount of pesticide is required and only need based; timing of the sprays in relation to the vulnerable stages of the pest; and correct adjustment of crop rotations.

Biopesticiide units in the production of neem seed kernel extract (NSKE), neem oil, production of Trichogramma with the SHG or cooperative farmers group on community basis is an important part to implement development organizations.

Pesticides and emission into the Environment:

High rates of use of pesticides(chlorinated compounds, carbomates, granules, some times pyrothroids, systemic insecticides and fungicides, strong herbicides like round up, spraying pesticides at milky stage of the crop) for controlling fungal diseases and insect pests of paddy, for example, may lead to high levels of toxic residues entering the non-agricultural environment. Presently, the usage of Herbicides is slowly picking up and in general Agrochemicals with new molecules with small quantities and most of the bulk has been reduced (A.P.Directorate of Agriculture,2003). Depending on the nature of the compounds and their transformation in the environment, they may variously be dangerous or more benign for short or long periods.
The organochlorine pesticides from the surrounding paddy fields are another source of pollution in the rivers of, Krishna and Godavari at Andhra Pradesh and are responsible for deterioration of water quality. Besides these, additional nutrients enter the river with the domestic sewage from the settlements especially the Godavari and Krishna command areas.

The intensive use of pesticides leaves high level residues in soil and groundwater. Organic activity is an essential component of humification in improving soil structure is thereby impaired. Slowly degrading compounds cause a gradual build up of residues in the soil and threat to underground water in the form of deposits and this is very common in case of herbicides and is a very common present practice with the Godavari delta farmers. Organo chloride insecticides tend to accumulate in the biological food chain of predators. Hence, to prevent environmental emission correct application practices with good quality sprayers, method of application say, low doses with short periods and also integrating other physical, mechanical and manual methods in achieving zero pesticides after few seasons; policy to restrict or prohibiting the harmful pesticides is also important in reducing environmental pesticide emission regulation. Hence, the partners of development organizations should be thoroughly educated in the IPM and safe use and handling; and National policies on pesticides in order to implement with their farmers.
Over use of pesticides and deviation in the restriction of 12 banned and endangered pesticides (Table.5) is the root cause of the problem of excessive pesticides residues in environment, food and agriculture produce. Increased awareness, training on state and national policy on pesticides, safe use, banned etc. is the only way in which the adverse impacts of pesticides on human health and environment can be contained. It is also pertinent to mention that presence of pesticide residues in paddy grown is hindering exports potential as most of the countries now extremely particular and strict about it.

In Tamil nadu the common pesticides used for paddy cultivation are Bavistin, DithaneM-45, Monocrotophos, Cypermethrin, Chloropyriphos and Malathion, Herbicides (Butachlor, 2-4, D).Pesticide consumption also drastically reduced to 2735 Mt, technical grade from 5010mt during 93-94 and 3394 Mt during 94-95.

In Andhra Pradesh most of the paddy seed producing co-operatives stock the seeds in the godowns were d protected with chemicals to avoid storage pests. They take up Malothion,monocrotophos,DDVP(Chloropyriphos) spray on bags as cocktails to contain paddy storage moth, Sitotriga cerealella, once in 15 days and about 12 sprays which is extremely dangerous in getting in to the hull and the persons working continuously in the godowns.Plant botanicals which is having fumigant effect could be the one of the option along with installing pheromone traps in the godowns to trap adult moths, and which can significantly brings down the pesticide loads in the storage godowns.

Post-harvest:

Farmers dry unthreshed paddy (sheaves) in open by spreading or as bundles placed in the field as such. This practice is causing serious problems like; impact of direct solar radiation which over dries the upper layers fast retaining higher moisture in lower layers of the sheaves, thus creating heterogeneous moisture content in the grain; direct exposure of grain is vulnerable to high humidity, mist, drizzle and light showers which results in sprouting; and leads to alternative wetting and drying due to mist and dew during nights and drying in day time. This situation helps in the incidence of storage fungi and bacteria resulting in discoloration and spoilage. These conditions facilitate sun cracks and promote breakage. A specific method by some farmers from Godavari delta, where harvesting and bundles has to be made in such a way that the successive bundles overlap and the panicles are always covered by the straw. These arrangements of sheaves provide good protection to the panicle against dew, mist and light to moderate showers, so that the above detrimental effects can be partially avoided.

In kuruvai season, farmers in Tamilnadu harvest of paddy synchronizes with rain fall and moisture content of paddy reaches a maximum of 22 to 24 percent. Tamil Nadu civil supplies corporation purchases this paddy even under the instructions from Government of Tamil Nadu and reduces the price according to moisture content. The prices are fixed for 18 percent moisture. When the moisture percent exceeds this limit by one percent the price will be reduced by one percent. In other words the price of paddy is reduced by that moisture percentage exceeding 18 percent. In this state also suitable paddy processing technology for drying of paddy including the varietal potential for above abiotic stresses should made available particularly for small farmers and millers.

Food Corporation of India(FCI) godowns:

Most of the FCI godowns in India stores the paddy use Aluminum, phosphide tablets (56%w/w minimum Aluminum phosphide active ingredient and 44% w/w maximum inert ingredient at the rate of 12 g/square Mt. Here also identifying and use Plant botanicals with the help of Central institute of medicinal and aromatic plants(CIMAP), which is having fumigant effect could be the one of the option along with installing pheromone traps in the godowns to trap adult moths, and which can significantly brings down the pesticide loads in the storage god owns.

The analytical capabilities of pesticide testing laboratories needs to be improved to test newer pesticides . It is also recommended to train the members along with pesticide dealers and distributors for pesticide safety, regulations and environmental fate. NGO,S should try to learn more on these issues including some campaigns.

Programme focus on Sustainable paddy cultivation in these regions need to include in their activities the following areas of intervention, in order to achieve an effective movement that addresses both women and men's priorities:

- Train field staff in gender-sensitive and participatory planning and programme implementation;
- Identify and respond to agricultural and household technology needs of women with context to health and environment, in close collaboration among agricultural researchers, implementing agencies, grassroots workers.
- Pay attention to health issues in the agricultural system, control of water-borne diseases and safe pesticide-handling methods;

II. Methane emission:

Methane derives from several natural processes such as vegetation decomposing in swamps, but in terms of quantities contributed to the atmosphere it is human-controlled/managed paddy cultivation processes that are most significant. The two that are both large and difficult to address are inundated paddy fields and ruminant livestock emissions. Growing paddy under other than flooded conditions is technically feasible but not economically so for the foreseeable future in the vast paddy fields of these states.
Methane emission from paddy fields is one of the investigations where CRRI has undertaken and observed that methane emission from paddy fields in India was much more less compare to USA and china. Methane production in paddy fields is insignificant even in the swampy and coastal areas, where farmers cultivate Paddy around the year.However, efforts should be made from HIVOS to train its partners in understanding these specific issues and collaborative plans can be made to analyze the impacts with specialists.

Methane production in paddy fields is insignificant even in the swampy and coastal areas, where farmers cultivate Paddy around the year.However, efforts should be made from Institutes and organizations to train its partners in understanding these specific issues and collaborative plans can be made to analyze the impacts with specialists.

III. Women in Paddy cultivation:

The chances of exposure to Organo chlorides, granules like carbofuran,phorate and many herbicides during transplanting and weeding by women is very high and hence the risks of dangers to their health is more. Systematic studies on impact of chemicals on women in paddy ecosystem have to be studied on a priority basis.

A number of environmental trends have an impact on rural livelihood in general and on women's lives working in paddy fields in particular. Women are usually disproportionately affected because they are more dependent on natural resources in order to carry out their farm and household activities.

Rice is typically produced in four ecosystems: irrigated land; rainfed lowland; upland; and deepwater and tidal swamps. Irrigated rice constitutes about half the total harvested area but contributes to more than two-thirds of the total production. All these ecosystems have different requirements and they face different constraints. In many areas, activities related to planting, weeding, harvesting and processing of the crop varies (FAO 1997).

IV.Hybrid paddy may deplete nutrients very fast and crop require high amounts of nutrients and intern intensive areas would be further supplemented with high chemical fertilizers and chances of loosing soil physical structure and fertility is very high. Only 10% yield increase over regular HYV and is not significant in Cost: benefit analysis. Consumer preference is very low as the taste is not good . Hence, the partner NGO, s and other related development organizations should concentrate in their seed multiplication programme with farmers only with improved and few local scented paddy varieties and this will enhance the availability of quality paddy stock seeds along with seeds supplied by seed corporations and exchange taken place among paddy farming community.

Agricultural University, ICAR institutions and seed corporations should also undertake research and production programmes with identifying local scented varieties and may be with some improved varieties to cut the budget on Hybrid paddy research and thus helps in maintains maximum stock seed and can be available to the farmers in all the seasons.

There is inadequate testing and regulations and therefore the labeling of all **GMO** and **GMO by-products** should be required by National law.
Indian Council of Agricultural Research(ICAR),institutes like Directorate of Rice Research(DRR),Hyderabad; Central Rice Research Institute(CRRI),Bhuvaneshwar and many TNAU,OUAT,MSSRF and private companies like Indo-American seeds,Pro-Agro, MAHYCO ,MONSANTO, SYNGENTA are involving in the production of GM paddy to improve,beta-caratonoids, proteins(Golden Rice),saline tolerance etc. In the country other than cotton, Paddy there are 40 crops under GM research trials.So, for the results from GM cotton in Andhra Pradesh, Tamil nadu and Karnataka is not encouraging.

GE foods may unexpectedly produce toxins dangerous to humans,GE foods increase food allergies. There is insufficient research and inadequate regulation encouraging premature trust in the safety of GMOs. Consumers need to make their own decisions about GMO safety and therefore labeling GMO products is necessary consumer information. GMO labeling laws are long overdue, therefore our recommendation is to immediately implement mandatory labeling of GMOs and GMO products.

Genetically modified crops threaten the authenticity of organic and conventional Agriculture. India has got maximum germplasm collections of paddy and hence it is very important to the institutions to select and screen for available lines acclimatization in all these three states Agro climatic zones for their better productivity, disease resistance and other qualitative and quantitative parameters. When hybrids itself is rejected by consumers,definetely GM paddy also don't have place in the consumer market.Hence,observing the live examples of failure of GM Cotton,definetely GM paddy research and development should hardly makes impact on overall situational changes in paddy chain itself.

V.Environmental issues associated with Rice Milling:
Rice mills:

Observations at parboiled unit confirms Steam boil for 2 hours, advanced sound proof machines, have license from Tamilnadu state pollution control board. No chemicals used during processing or mixing with Processed Rice. No dust pollution. Recovery rate is 52%.Not enough safety measure like gloves and physical protectors to the eye, head and against dust allergy, provided to the workers in the mill.

a) Hygiene: Hygiene standards should be addressed in handling and storage of paddy particularly in heavy and excessive application of pesticides in the godowns (Warangal district of Andhra Pradesh); regular hygiene checks should be carried out al different stages of milling for the presence of chaffy grains, inert materials and for insect and Rats fecal material which is some times lethal to human beings.

b) Effluent discharge and water management: Paraboiled Rice requires lot of water for soaking the paddy. The water which is discharged after parboiling if not treated properly could result in water pollution; that can be caused by surface runoff and contained high level organic materials and may contaminate regular water cycle.

c) Dust, Air pollution, Noise and Odour management: Release of dust to the atmosphere, internal and external noise may cause health hazards and odour release from parboiling stored water may also a concern for health of the workers.

d) Solid waste disposal: Husk from the paddy and wastes from cleaning process are also some time the concerns for health of workers handling the paddy.

VI. Rice Exports:

The fact that there is still a very good scope for enhancing exports. Practical quality constraints like lack of quality consciousness, microbial contamination, pesticide residues, adulteration of Ordinary rice as Basmati Rice by spraying spurious scents, lack of strict laboratory tests of export of Rice for its edibility at international standards are not palatable to the importers. Methyl Bromide container fumigation for exportable Rice is a common method and potential scope should be identified whether some plant botanicals which are internationally accepted can be used for fumigation.
Similarly, marketing for certified as organically grown products is a tiresome process and costly that affects the Indian growers who are interested to export the Rice. This needs to be simplified while keeping the quality of products and human health in view.

VII. Organic Farming:

Organic paddy cultivation can link food production, income generation and environment protection requirements by making use of maximum local knowledge, biodiversity, on farm resources and alternate pest control methods and avoiding the use of agrochemicals. The approach is receiving with the withdrawal of government subsidies on agricultural inputs, the introduction of policy and growing concern of food safety and environmental protection. Different farming systems do have implications on the productivity, sustainability, production orientation and ecological situations. While modern commercial (conventional) Paddy cultivation is unsustainable and market oriented the organic (sustainable) farming do have merits like productivity orientation, ecological sustainability farm complexity and better cost: benefit analysis (Table - 1). Non pesticide management (Green manure-Diancha,Silt application to land, Chill+garlic,neem oil,cowdung,cow urine) practices were also followed at the organizations like CROPS, JANGAON,WARANGAL district. Using the varieties WG-14 and JGL.Where as the conventional farmer used 3 sprays of chloropyriphos, ekalux, carbofuran, irrigated regularly at least 15 times in the season resulted in low yield than organic farmer. The spread of the technology is being observed NPM-farmer to other farmers.

Similarly at Gundla singaram farmers are using Green manure,Aplication of sheep manure and FYM in sufficient quantities,NSKE,cowdung and cow urine use on W 14 fine variety resulted in better yields and reduction of pesticides about 80% in the first year. Farmers also recognizes that paddy is produced by this method is tasty for consumption.
Exclusive organic cultivation of paddy with out using chemicals is a challenge under high productive intensive paddy zones of the command delta regions.

Non-basmati rice especially long (BPT 5204) and medium slender grains (MTU varieties) have good export market. There are many such varieties grown on rainfed lowlands and in future importance should be given to grow these varieties using ecotechnologies ignored to get fine quality and international competition.
Infact, the Rice mill owners association of Warangal in Andhra Pradesh, has expressed the availability of the above inputs is very important to make paddy cultivation more sustainable and quality and even it helps them to think of exports.

Organizations and development departments working on sustainable production of paddy by using non-pesticidal and sustainable agricultural practices (use of Green manuring crop, deep summer ploughing, Vermicompost, farm yard manure,NSKE 5%,Neem oil and Bird perchers) with its partner organizations. The difference in the cost of cultivation was because the SA farmers used NSKE 5%,neem oil,vermicompost and other Eco-friendly SA options as a prophylactic measure to control pests, where as check farmers used pesticides and chemical fertilizers indiscrimainately.Growing green manure crop and incorporating the same has totally reduced the application of fertilizers (Table.8)

Department of Agriculture in Andhra Pradesh also has given emphasis on vermicompost production under the improvement of Organic farming component and has been subsidized at Rs.5000/- .It is earmarked for some farmers to grow Paddy and even other crops like vegetables and plantation crops. Efforts were made by some societies in conducting Seminars on biopesticides and cakes in paddy seed production and cultivation is recorded.

Agricultural research Institute at ANGRAU,in the First year 21 varieties were screened for suitability of organic farming and 6 varieties(Samba mussorie,early samba,kavya,swarna,tellahamsa and erramallulu) suitable and little reduction in yield. Early maturing varieties and can perform in limited water conditions. later experiments were conducted with M-7 early maturing variety and a mutant of BPT with organic methods of cultivation using green manure and FYM resulted in 10 qt. more yield, Low pests and diseases, decreased Fertilizers consumption.

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Table: 1.Indicators of Paddy production systems at CROPS organization, Jangaun, warngal

System Indicators	Conventional farming	Organic farming	Impacts of organic farming over Conventional practices.
Productivity Sustainability Farm complexity Environment diversity Production orientation External inputs i)Seeds ii)Agro-chemicals	High Low Simple Uniform Market HYVs High	High High Complex Diverse Subsistence and or Market improved local (WG-14,JGL) None	100% reduction in pesticides. 15% increase in yield. C:B ratio is 1:1.89 compare to conventional(1:1.12) Horizontal and vertical spread. Empowerment and decision making powers. Environmentally safe,ecofriendlly and effective

Table: 2. Paddy Varieties in Different Categories of Land Used by the Farmers in Western Orissa having lateritic to slightly black soil.

	At Land	Mal Land	Berna Land	Bahal Land
Duration	60-65 days duration	90 -110 days duration	120-130 days duration	145 days to 155 days duration
Local Varieties	Saria Dhan, Tikira Dhan,	Harisankar, , Lahadi, Biramani, Changri,	Kuresar, Agamachi, Ketura, Sana	Jhili, Asamchudi, Basmati, Nadiakata, Yubaraj, Sabri
High Yielding Varieties		Khandagiri, Arnapurna	Lalat, Sarathi, CR-1001	Swarna, Jajati, Tulasi, Surendra

Commonly grown high yielding varieties in Western Orissa

	Berna Khari	Vari Land	Bahal Land
Duration	90 -110 days duration	120-130 days duration	145 days to 155 days duration
High Yielding Varieties at Nuapada,kalahandi	Tichung	Lalat,	Swarna, CR-1001, IR-36
High Yielding Varieties at Bolenger	Khandagiri, Parijat	Lalat, Swarna, Parijat, IR 36	CR-1001, CR- 1009, CR-1040, Jajati,Swarna,

Table.3 commonly grown high yielding varieties in Godavari and Krishna deltas of Andhra Pradesh

Improved varieties	General Characteristics
Swarna MTU 7029	BPH tolerant, total acclimatized,
Chaitanya MTU 2067	Krishna delta, BPH tolerant,
Krishnaveni MTU 2077	Krishna delta, BPH tolerant,
Prathibha MTU 5293	BPH tolerant,
Vajram MTU 5249	BPH tolerant,
Deepti MTU 4870	BPH tolerant
Prabhat MTU 3226	50 bags/acre, best for parboiling and used for Idli and Dosa preparations,
Vijetha MTU 1001	
Sir Cotton Sanalu	120 days, short duration, Planted in both kharif(145) and rabi(120) seasons,

Table.4.Commonly grown high yielding varieties and distribution of certified seeds in Tamil Nadu:

Red Ponni,IR-20,PY-1,PY-2,CO-43,CO-44,Savithri,IR-36,ADT-16,ADT-36,Paiyur-1,TKM-9,ASD-16,IET-1444,MDU-1
F1 Rice occupies 17% and major hybrids are DRR-1, KRH-2 and COH-2.

Distribution of certified seeds in metric tons.

Districts	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Trichy	1111.4	1637.2	785.5	662.1	608.9	543.3
Thanjavur	1738.5	2037.2	1566.9	1867.5	2154.5	1668.8
Erode	513.1	568.6	550.6	648.2	771.1	660.7
Total from this 3 and other districts	18342.2	19781.3	18113.8	18015.0	22480.0	18010.0

Table.5. Pesticides Banned and Restricted for the use in India and banned pesticides in Europe used in India with different trade names.

Sl.No	Banned	Restricted	Banned in Europe	Used in India
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	Aldrin BHC Calcium cyanide Chlordane Copper actoarsinate Dibronochloropropane Endrin Ethyl mercuric chloride ethyl parathion heptachlor menazon Methomyl Nicotine sulphate Nitrofen parquet dimethyl sulphate PCNB PCP PMA MSMA tetradifo Toxaphene	Aluminium phosphate Captofol Chlorobenzilat e DDT Dieldrin Ethylene dibromide Lindane Methyl bromide Methyl Parthian Sodium cyanide	Allethrin Butachlor Chlorofenvinpho s Dalapon Dichlorpop Ethion Fenaxaprop Fenpropathion Fenpropathrin Formothion Isoprothiolane	Metolachor Metoxuron Monocrotophos Oxycarboxin Phenthorate Phorate Phosphomidon Profenophos Quinolphos Temephos Thiometon

Source: 1. Ministry of Agriculture, Government of India, Annual Report, 2003,
2. Down to Earth, 15 February, 2003

Table.6.Total consumption of pesticides in Andhra Pradesh during last 5 years :(in metric tons)

1997-98		1998-99		1999-00		2000-01		2001-02	
A	B	A	B	A	B	A	B	A	B
9000	7298	9000	4741	4267	4054	4512	4000	4000	3850

A= Estimated Demand, B= Consumption

Table .7.Quantity of Paddy certified seed produced by A.P.Seed Corporation.

Years of seed production	Area offered(ha)	Area certified(ha)	Quantity certified(quintals)
1998-99	39793.08	39073.38	1019679.95
1999-00	37509.24	37175.24	683190.43
2000-01	30084.12	29839.22	900269.97
2001-02	26716.60	26236.12	709139.27
2002-03	19184.40	18653.92	555003.37

Table.8.Cost: benefit analysis of Paddy cultivation through SA using non-chemical practices.

Sl. No	Organization	Cost of cultivation		Average yield		Average income		C: B ratios
		SA farmer*	Check	SA farmer	Check	SA farmer	Check	
1	CEAD	Rs.9900/ha	Rs.13650 /ha	37.5 Q/ha	33.5 Q/ha	Rs.9220/ha	Rs.3435/ ha	SA=1:2.17 CF=1:1.12
2	GMM	Rs.13033/ha	Rs.12278 /ha	49 q/ha	46 q/ha	Rs.11667/ ha	Rs.8447/ ha	SA=1:1.98 CF=1:1.17
3	MARI	Rs.11720/ha	Rs.14305 /ha	56 q/ha	58 q/ha	Rs.7080/ha	Rs.5995/ ha	SA=1:2.79 CF=1:1.62
4	SECURE	Rs.13558/ha	Rs.15875 /ha	61 q/ha	60 q/ha	Rs.7792/ha	Rs.5125/ ha	SA=1:2.8 CF=1.1.36

*Average of 5 farmers

Acknowledging the Role of Gender in farming, particularly informal Seed Sector and krisoks' Perspectives.

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Seed-the source of life. And woman holds the seed with the hope of new life.

Statistics shows that women's contribution the agricultural production ranges from 40% in Latin America, to between 60% and 80% in Asia and Africa. Overall, it is estimated that women contribute 50% of global food production. It is true that technological commodities are gradually removing women from the agricultural field. But women's contribution to family nutrition is significant since they are responsible for vegetable, fruit, spice growing and poultry-livestock raring in homestead agriculture. For sure these are major source of food security in the households. In the perspective of Bangladesh till now the agricultural tasks with men. More over some agricultural activities are fully in the hands of women. Post harvesting operations and homestead agriculture is the major. A homestead garden is the most complex agricultural system. It contains a higher density of diversity. This mixed and multistoried cropping needs the highest attention of designing and decision making in every step from crop selection to seed preservation for the next years. The homestead agriculture also support the family with the daily commodities, those are needed to buy from market.

Instead of producing diverse seed from homestead agriculture, women are engaged traditionally to select seed, drying, preserving, protecting during storage, saving them from any economical crisis of the family. To ensure the seed quality and the perfect storage place & methods, women hold the vast knowledge. They decide the quantity and variety of seed to be saved and the method of preservation. Seed selection by women is a continuous activity. Working in the fields, they observe the plants and decide which seeds to select. They identify plants of good quality on the basis of size, grain formation and their resistance to pests and insects. Here a woman looks at the seed from the view of a seed scientist. In this case, species purity, freedom from weeds, cultivar purity, germination capability, vigor, size, uniformity and health are being considered. For the storing place and method, they take care more to maintain different moisture content of different crop seeds. In these case, they use the experiential, intutional and experimental knowledge.

Sometime the relation between seed and women is beyond 'rationale'. Sometime the women hold such knowledge about seed that are not also 'rational'. For instance, to cross the floodwater tying up the jackfruit seeds in a thin fabric. But interestingly, it could have quite scientific base.

On the point of seed, clearly to say, of the knowledge about seed, a woman never has conflict even with her rival. It is definitely interesting to see two women engaged in quarrel with the pick of their voices, but in the middle, one is asking other to test the moisture of the dried seed whether they are ready to store or not. The other is doing the job without any argument. It doesn't matter that the quarrel started with the picking up the seeds by the other's poultry!

Besides being the providers of life women also nourish and sustain life. It must be acknowledged that traditionally it was the woman, who played an important role in conserving life forms, which is ignored due to gender inequalities and it is now the woman who bears the brunt of environmental degradation by decreasing access to biological resources of her village. Furthermore, the organic women farmers in the region have taken prime responsibility to revive depleting indigenous livestock and poultry species of the region, as organic farming practices is interdependent on livestock and poultry for soil fertility management and animal traction.

Women also holds an indivisible part of bearing the traditional wisdom and the practices and process for using of medicinal plants as the custodians. This precious and sophisticated system of knowledge has been developed by using over for centuries under local laws, customs and traditional practices. It is evolved and transmitted from generation to generation. There are often spiritual components in the traditional wisdom peculiar to each community. This genetic resources, next to food crops, whose earliest and most knowledgeable custodians are local communities-especially the farming communities. Women play the vital role in conserving and exploring traditional knowledge based wisdom. From ancient times, they have been adding significant values in their family and Samaj(Community) by holding this experiential wisdom. Women, with their central role in the household in village societies, have been responsible for the food and nutritional needs of their families. The proverbial "grandmother's cures" often hold the key to many curative plant uses. Also, even today Traditional Birth Attendants perform midwifery and other basic healthcare functions in a majority of rural societies.

Women's specialised knowledge about genetic resources for food makes them essential custodians of agro-biodiversity. In the livestock sector, women feed and milk the large stock, while raising poultry and small stock such as sheep, goats, hens and ducks. Women have unique knowledge about the value and use of genetic resources for food and agriculture.

It is obvious that a sound agriculture firstly needs good seeds. To a farmer, good seed doesn't represent only good (higher) production but also it shouldn't have any negative impact on surroundings environment (e.g., soil, water, air, flora % fauna etc.) and health. As a result, a good seed to the formal scientist might not be able always to be accepted by the farmers as a good seed of course. Moreover, seeds are very often seen as from economic point of view. But to the formers, especially the women, seeds are being respected as the source of power, love and life.

In Bangladesh 700,000 mt. of seed of nearly 100 crops are sown every year. BADC(Bangladesh Agricultural Development Corporation) distributes 3%~5% of paddy, 20% of wheat, 6%~8% of high input potato, 20% of jute, 2%~3% of pulse & oil and negligible percentage of vegetable seeds against the total requirement of the country. 1000 mt. of vegetable seeds are used annually. Among them 350 mt. is imported and a small amount is supplied by the farmers through traditional channel. So hopefully the largest portion of the total needed seed is being produced by informal sector. Homestead agriculture is a major source of informal seed. Not able that formal seed production is highly centralized, 'top-down' and non-participatory approach. Farmers have become mere recipients of institutional seed, rather than participants in the process. As a result, they are dependent on external solutions designed to solve their own problem. Moreover sometime the projected solutions make complicated long-term problems (like resource degradation, ecological disaster etc.). It is now recognized globally that projects which are locally-conceived and which build on directions initiated by women themselves have a greater chance of affecting their status favorably than initiatives imposed from outside. In Bangladesh, women are also related to the formal seed sector by purchasing institutional seed, as their buying capacity is increasing through different development interventions. But in the formal seed industry, a woman has nothing to do much but working as daily labour.

Exchange of seed is another good criteria of healthy agriculture. The relationships between the pattern of the transmission of knowledge about seed and the pattern of exchange of seeds-mainly takes place between women and have more of social than an economic function in local context. Women have a rich understanding of their seed resources and often are adept at experimenting and adapting to change over time. This knowledge definitely is not stored in printed form of computer database, but is blended into women's daily life practices, songs, beliefs and so on. Most of the time, they often are not willing to share the knowledge with outsiders, because the knowledge provide them with an economic or social edge within the local society. This knowledge is however not al all "unexchangeable". But this exchange of knowledge and opinions should not only refer to the resource base itself, but also to its use and management and to the way in which these can be improved.

Now a day, seed is not only related with women and indigenous knowledge but also with international trade and intellectual Property Rights. The issue of the 'commodification' of seed and the drive towards the control of genetic resources and the materials derived from has raised environmental, social, political, ethical and economical questions. However FAO/IPGRI working papers recognized the difficulties to quantify the value of genetic resources, which often has added or associated value not reflected in its market price. But for sure most of the credit of genetic resources goes to Women. So it is everyone's moral duty to give credit where credit is due to explore the tremendous potentialities of the informal seed sector in the development of a national 'seed security'. **At least in the question of "SEED", man is not competitor to woman, but for sure complementary.**

Women are taking their fate into their own hands. Rural women in particular are responsible for half of the world's food production and produce between 60 and 50% of the food in most developing countries. Yet, despite their contribution to global food security, women farmers are frequently underestimated and overlooked in development strategies" (FAO 2002)

In most developing countries, both men and women farmers do not have access to adequate resources, but women's access is even more constrained as a result of cultural, traditional and sociological factors. Accurate information about men's and women's relative access to, and control over, resources is crucial in the development of food security strategies.

FAO studies demonstrate that while women in most developing countries are the mainstay of agricultural sectors, the farm labour force and food systems (and day-today family subsistence), they have been the last to benefit from – or in some cases have been negatively affected by – prevailing economic growth and development processes. Gender bias and gender blindness persist: farmers are still generally perceived as 'male' by policy-makers, development planners and agricultural service deliverers. For this reason, women find it more difficult than men to gain access to valuable resources such as land, credit and agricultural inputs, and to the technology, extension, training and services that would enhance their production capacity.

Although the role of women is identified as the world's principal food producers and providers, they still remain 'invisible' partners in development policy planning and strategies. A lack of available gender disaggregated data means that women's contribution to agriculture in particular is poorly understood, and that their specific needs from ecofeminism perspectives are too often ignored in development planning. This extends to matters as basic as the design of farm tools. But women's full potential in agricultural must be realized if the goal to halve the number of hungry people towards enjoying a happy life in the world is to be achieved.

There is a growing recognition worldwide that gender bias and blindness constitute significant constraints that contribute to food insecurity given the critical role of women in determining and guaranteeing food security as food producers, food providers and contributors to household nutritional security.

Although rural women are assuming an increasingly prominent role in agriculture, they remain among the most disadvantaged of populations. At the same time, there is growing evidence that reducing gender disparities promotes agricultural growth, greater income for women and better food and nutrition for all. The integration of a gender perspective that recognizes the different roles, constraints and access to and control over resources of men and women in agriculture and rural development must therefore be at the heart of any strategy for food security and poverty alleviation.

The Convention on Biological Diversity recognizes 'the vital role that women play in the conservation and sustainable use of biological diversity' and confirms 'the need for the full participation of women at all levels of policy-making and implementation for biological diversity conservation'. And yet neither the decisions of the Conferences of the Parties nor the recommendations of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) have taken much account of the significance of gender in the attainment of the convention's objectives.

Another important issue in the human-environment relationship deals with gender roles and status in the society. Men and women are constantly a materialistic and communicative interaction within and between themselves and with the external power of world. Whenever sccio-cultural systems dictate differential role patterns and life styles for men and women, their respective roles in the management of the environment tend to differ. Analyzing from the development ecology and gender points of view, Shiva(1998) finds that the organic process of growth in which women and nature work in partnership has created a special relationship of women with nature. Mies (1988) summarized the process as follows.

(a) Women's interaction with nature, with their own nature as well as the external environm ent, is a reciprocal process. They conceive of their body as productive in the same way as they conceive external nature to be the productive; and
(b) Although women appropriate nature their appropriation of external environment is neithe r a relationship or domination nor a property relation. Women are owners neither of their body nor of the earth, but they co-operate with their bodies as well as with the earth in o rder to let it and make it grow.

According to international women policies the basic problem in gender relations is the structurally unequal power relations between men and women. In this understanding, gender, that is the meaning of being a man and woman is neither fixed nor biologically or naturally given, but a social construction. Power is directly related to gender when gender is a primary way of distributing and using resources. On the other hand power is indirectly related to gender in the operation of rules. This means the norms and symbols concerning masculinity and femininity are founded in social interactions as well as in social institutions and organizations. (Verloo/Roggeband 1996:7)

From *Krisoks* point of view, in every samaj or community, there has a rich tradition of systemic knowledge on the farming practices, coupled with rich biodiversity and different kinds of conservation ethics having intrinsic spiritual values – that influence the rural community to feel the nature. Those spiritual beliefs and over so many years' experiences, dependency on local ecosystem resources and natures benevolence inspired the local people to rely on their traditional experiential wisdoms and practices. We *krisoks* do respect individuality of all forms of life – but under fulfillment of certain norms and values of its own community. The initial attempt to understand the linkages between gender and biodiversity (including agrobiodiversity) we have been trying to establish the social construction of gender roles and highlight certain gender dimensions of conservation and resource use. *Krisoks* perspectives recognizes that the empowerment of women is key to raising levels of nutrition, improving the production and distribution of food and agricultural products, and enhancing the living conditions and standards of rural live and livelihood. *Krisok*s movement for women in Development ensures that gender concerns and women participants are integrated in all relevant activities. It aims to give women equal access to and control of land and other productive resources, increase their participation in decision-and policy-making, reduce their workloads and enhance their opportunities. Identify, analyze and trying to determine the factors and issues related to complex inter-relationship of gender, ecology and environment by giving special emphasize from gender point of view. Seeking to strengthen women's knowledge and wisdom for equal participation, decision-making and empowerment of women. We all are a part of the "Nature" and Nature exists through us. With all the elements of nature we *Krisoks* are proffering new wisions of enjoying "Notun Jibon" (New Life) toward a just and peaceful local community for women and men. Integrating women in all strata of agriculture and organic farming as well is a social movement by local *krisoks* community on the way of life, a struggle with all the implications of the word "happiness and sharing."

The above informal discussion can lead the following conclusion:

- Homestead agriculture should have to be given the priority for Research and Developme nt.

- Community seed industry is a good option for Bangladesh and Asia as well, where com munity itself will decide which seed should have to be produced, how much and how. Fu nding agency will monitor only.
- Women(with family) will be the shareholder of the industry after certain time of involve ment.
- Women's knowledge on seed should be documented, tested and compared with modern s cientific knowledge. After screening the knowledge, these will be disseminated to others through training, field practices etc.
- Farmers' right on genetic materials could be ensured on regional basis
- In the question of any research, "Risk Factor" should have to be included particularly ge ndered risk perception of technology and natural damages.

Gender concerns should be mainstreaming in all programmes and activities in agricultural sector

- determine the factors and behavioural patterns that influencing the initiatives of involvin g gender in all strata of farming sector.
- Giving special emphasize on the daily life experiences of women and its relevance for en vironmental and agricultural strategies by reflecting the power of women to create and sh ape the everyday life.
- Gender-sensitive indicators and social-sensitive technical design should be adopted or int egrated.
- Women's positions in science, agriculture, technology and politics (in planning positions , decision-making positions and controlling positions) should be promoted.

Women should not be seen in isolation. Broad-based policy initiatives in favor of women should be taken. Their roles and economic contributions have to be viewed from the perspective of the natural, social and economic framework within which they live.

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Gender Imbalance in Agricultural Policy Making Bodies – the India's context –

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India is a "Sovereign Socialist Secular Democratic Republic" Fundamental rights are accorded to its citizens under articles 12 to 35 of the Constitution. Fundamental rights secure social, economical and political justice; Liberty of thought, expression, belief, faith and worship, Equality of status and of opportunity on the ground of religion, race, caste, sex or place of birth and assuring the dignity of the individual and the unity and integrity of the Nation.

Thus the Indian Constitution guarantees the fundamental rights of all its citizens without any discrimination against gender. What then are the issues that need to be addressed? Is there a case for Gender Equality? First of all, what do we understand by the term "Gender"? Is it the socially determined division of roles and responsibilities between man and women? Different societies perceive gender variedly and assign roles to women unequally! The expectations of how a woman should live in a society, at home, on the street or elsewhere are also different. Thus, from birth to death, the male-dominated society has not perceived woman as equal and given her the rightful place, though all religions and almost all the governments of the World speak volumes and claim that women are treated well in their countries. It even starts from the birth of female child or even at womb stage when the child's right to live is usurped or extinguished in some ill-conceived thought and action of people.

The census statistics of India indicate that during 1991 and 2001, the male population stood at 439 and 531 millions compared to 407 and 495 millions respectively, i.e. females per 1000 males stood at 927 and 933 in these years. Pre-conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) Act 2002, in Haryana, is an amended act of Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act 1994. As per directions issued from Supreme Court, the quarterly report up to 31-3-2004 indicates that 786 ultra sound machines have been seized and sealed and 21 cases have been filed against the violators of the various provisions of the PNDT Act.

Vimochana, a woman's organization in Bangalore, India, has exposed a blatant violation of the PNDT Act by doctors. The state governments and non-government organizations have requested the center to stop the import of these advanced sex determination machines (Deccan Herald, 30th of April, 2004).
The literacy rates too were lower with women at 22, 30, 39, 54 percentages compared to 46, 56, 64, 76 in men in the years 1971, 1981, 1991 and 2001 respectively. These figures reflect the progress and trend the country is marching towards and not to speak of the poor representation in

almost all fields. The trends of literacy and performance by girls in schools and collegiate education may change slowly. The equality in performance in studies and sometimes slightly superior till collegiate education, by girls has been observed in recent years. To quote, in this year's ICSE and ISC examinations, girls have fared better with 94.5 and 96.5 percentage pass compared to 92.3 and 92.98 percent pass by boys respectively (The Hindu, May 19th, 2004).

Rural women and self-help groups who are underprivileged are being trained by a project – 'Shakti' taken up by HINDUSTAN LEVER Limited, New Delhi. Currently 2500 entrepreneurs are being helped. The plans are to lift 25000 women in two years. That would cover 100000 villages and touching a 100 million rural Indians. The present household income would double from the current level of between Rs. 800 and Rs. 1500 per month.

To erase the ignorance and replace it with some knowledge on the rights, duties and responsibilities and about running village panchayats of Gujrat, a pilot project was initiated to train and empower 20 women sarapanchs / women members of local self-governments at village and taluk panchayat levels. Here, the woman sarapanchs learn tricks of the trade by Masuma Bharmal, The New Indian Express, 30th Dec. 2002.

It is regretful that women in many societies even today cannot come out of their houses partake in public functions. Many societies have devised and adopted the "purdah" or veil system curtailing the exposure of the faces of women and many do not guarantee their voting rights. It is heartening that Kuwait's Council of Ministers approved a bill giving them the right to vote and stand for Parliament. However, in 1999, hundreds of men cheered in the streets when it was announced that Parliament had rejected a bill to give women the vote (Kuwaiti Women may get voting rights. Guardian Newspapers Limited, 2004 – The Hindu, May 19, 2004).

Meera Chakravorty (2004) writing on "Gandhi on Women" says that attainment of 'Swaraj' (Independence) was the foremost goal in life. Mahatma Gandhi declared that to postpone social reform till after the attainment of Swaraj, is not to know the meaning of Swaraj. Therefore, let Congressmen begin with their own homes, the task of liberating women from tyranny". For him, action against other oppressions as also gender oppression and exploitation, however, were the first steps towards a political agenda. Again, Mahatma Gandhi was pained and distressed on several issues related to women's development being not fully helped by society including men and educated women through reform. He was forthright in condemning child marriage. "Popular evil can be destroyed by enlightened public opinion. Parents marrying their daughters of tender age should expiate for their sins by remarrying these daughters, should they become widowed while they are yet in their teens".

Meera Chakravorty (2004) explains Gandhi's view further thus: "Gandhi recognized that women have tremendous potential, the freshness of vision, the courage to experiment with new methods of action and the respect and dignity to go through it. Their mass participation in the struggle for Independence impressed him to say "Many of our movements stop half way because of the condition of our women. Much of our work does not yield appropriate results, our lot is like that of the penny wise and pound foolish trader, who does not employ enough capital in his business!"

The above two paragraphs giving the views of Mahatma Gandhi should make us determined to involve women in all aspects of life and give them the rightful share in Agricultural Policies right from taking decisions, participation in the development of agriculture and all allied disciplines, execution of projects, big and small, at the village, town, State and Government levels. Women should be empowered in claiming rightful share of land, animals and property rights at the family level and share the responsibility also equally well with concerned male members of the family. At the village and local levels of public administration she should have her own rights and be helped and trained for a few years to shoulder duties with men. The Vision should be to cut-off all shackles and restrictions that limit her growth and freedom. She is equal to Man!

The fourth World Conference on Women held in Beijing in 1995 was responsible for Gender mainstreaming as a global strategy for the promotion of gender equality. The United Nations Economic and Social Council indicates gender mainstreaming as "… the process of assessing the implications of women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences, an integral dimension of the design, implementation monitoring and evaluation of policies and programmes in all spheres so that women and men benefit equally." (UN-ECOSOC, 1995).

"The 1995 Beijing declaration and Platform for Action recognized that environmental degradation and disasters often have a more direct impact on women than on men. Global actors were urged to develop and implement gender-sensitive laws, policies and programmes on land-use, environmental management and integrated water resources management and to include gender analysis and methods of mapping hazards and vulnerabilities" (The Gender and Water Development Report, 2003). A few issues as presented in this report (in Table 1) are presented here as examples.

Table 1 Elements of a gender perspective by issue area for water for nature*

Hazards / Area	Key gender issues
Floods	Recognition of and attention to gender differences in vulnerability to floods and coping mechanisms Formulation of flood response and mitigation measures in a manner that is gender sensitive and recognizes that men and women have different roles and responsibilities and different types of vulnerability
Droughts	Recognition of and attention to gender differences in vulnerability to droughts and coping mechanisms Formulation of drought relief recovery and mitigation mechanisms sensitive to women's and men's different needs, roles and vulnerabilities
Desertification	Given the gender division of labor in most arid and semi-arid environments any anti-desertification measures should draw upon local knowledge about the environment as well as take care not to accentuate existing gender inequities
Water Quality	Given the typical gender roles of procuring water livelihoods and caring the two sexes may have very different stakes in water quality. Both men and women's voices should be heard.

* Examples from The Gender and Water Report

From Table 1, key gender issues provide a perspective. It is the role of women representatives to project these issues effectively in their forum when confronted with such calamities. The food chain has been deeply affected and is a serious concern when DDT pollutes mother's milk. In the policies being formulated, this issue needs a strong corrective including legislations. How can this be guaranteed if women are not represented in these bodies and if they are not aware of the great danger for human health!

Agricultural policy-making bodies are many but there appears to be 'trickle down' effect from policy-making to enacting the policy. Women practically had no representation in most of these bodies. A quick glance from top to bottom in public life and attainment emphasizes the total neglect of women in every sphere from ages and recognizable as not seriously corrected and recorded from the early 1950's, after Independence. Perhaps, it is a millennium's history and ethos, cultural and social, which was not congenial for growth and development of the female child, the Woman! The Constitution, in principle, protected the interests of woman but the soul and spirit of woman was not prepared to take on the onerous responsibility of the Village, State or the Nation. It has been a very, very weak representation in any public office! So far, neither a President nor a Vice-President of the country was a woman. There was only one woman Prime Minister in the last few decades since Independence. Smt. Indira Gandhi was sworn in four times; was Prime Minister for 5829 days and was one of the 10 women Prime Ministers of the world. Of the 28 states and 6 union territories, there have been only 11 woman Chief Ministers.

There has been only one woman Chief Election Commissioner, that too for a brief moment, so to say, for less than a month! Neither the office of the Speaker of the Lok Sabha nor of the Chief Justice of India has had a woman presiding over the affairs of the country. (Data from Manorama Year Books. 2002 & 2003)

Should India give a balanced representation to women in all spheres of life and especially in participating in decision-making processes of policy matters, whether they be at home, village, town, city, State or the Nation, then there has to be an attitudinal change, a legislative shift and mandatory civil codes. Women have to get into management ranks. Should you look at the scenario at all these levels, it is education, the right type of education that is the harbinger of development of mind and progress of the individual, irrespective of the gender, that is needed. The curricula have to be changed and need-based programmes are the need of the hour. Look at any State and look for good, honest administrative mechanism, which is generally deficient. What a contrast it is that we have surpassed 1100 million in numbers and hardly 6 – 8 percent are our women representatives in any public office! This is certainly Gender-Injustice!

The number of women in Lok Sabha in 1998 was only 39 out of 545. Women ministers were 4 out of 40. Percentage of women in the 13th Lok Sabha was 8%. The 2004 Indian elections are the largest organized human operation in the world. Some parties have put up 8 to 10 percent women as their candidates, although for the past several years, an election manifesto was that there should be at least 33 percent of women representatives in Lok Sabha, Legislatures, etc. Then what about women in Panchayats?

Is there any empowerment of women at the village level institutes? The National Policy for the Empowerment of Women 2001 was an attempt to help women across the country to provide the desired momentum in their struggle for equality and have a say in every aspect of life. The policy is indeed an all-embracing feature, emanating from national as well as international movement on women. Included in the policy are the issues of importance; imparting economic and social policies so as to eliminate all forms of discrimination against women. It is empowering women with active protection of rights, of decision-making and through strengthening institution system. Condition of work, employment, representation, access to credit, health, nutrition, child care, education, housing rights, property rights besides domestic violence, rape, poverty, etc. are all well set-out. What needs to be looked into for a good measure of implementing agricultural policies is that there is adequate representation of women at all levels. It has also to be ensured that such representation is not a proxy for decision-making or leading the group either through their husbands, relatives or elders, which was the case in some village Panchayats.

This is imperative of the fact that:

i. Men generally think that they are still in control of everything and that they could manipulate the proceedings or the recommendations of a village council meeting or
ii. Women think and act to keep peace at home and implicitly follow their husbands or leaders without honestly acting or deciding on their own. The mind-set of both has to change and real empowerment would therefore call for an education in democratic principles. Yoked to too many traditions, nagging poverty and lack of exposure to the World around, it may take

several decades yet to bring in a balance in the Agricultural Policy-Making bodies with rightful representation of women.

Starting with Lord Ripon of the British regime, local self-governments with democratically elected bodies to share power have given great hopes for redressal of local problems with participating local communities. The 73rd and 74th amendments to the constitution have made it obligatory for the states to hold elections to these local bodies periodically. When women are rightfully represented in all the local bodies at the village level, the mandal level and the panchayat level, they can take up "down-to-earth" issues concerning the welfare of not only themselves but also of the whole community or village. All aspects of management of common property, protection of pastures and lakes, distribution of yearly or periodical yields and fruits from among the community, management of tank-irrigation system, roads, schools, canals, etc. come under the perview of these concerned citizens and transparency is visible. There have been some successes also in areas of use of non-conventional sources of energy, biogas, and smokeless chullahs, solar energy and in making great efforts to protect and propagate forestry species.

Empowered women have shown the success of running co-operative milk production and collection, rainwater harvesting and managing lands under watershed principles and in saving even small amounts for education and better assets for the family. The question of 'Organic Farming' cannot be thought without the active participation from women. It is the woman who is traditionally well versed in seed-collection, harvest and post-harvest operations in crop-husbandry, maintenance of cows, buffaloes and rearing of sheep, goats, poultry and other birds. Hitherto her hands are tied up for want of right policies and community support. Investments too could only be made if the husband is inclined for such a caring act for a future. The policies of sinking a bore-well at a common place, the arrangement for a common transport and marketing from the whole village, planning on crops and cropping season, collective decision on control of diseases and pests could all be executed fairly well with well-meaning decisions by the women representatives.

Non-Government Organizations (NGOs) especially in the rural set up can help empowerment of women. Mass contact is essential in all participatory work for the village, be it the rehabilitation of a talk or the construction of a check-dam. The Government through mass media would do well in bringing awareness in all the important developmental activities by the mass contact and the driving force could be by the NGOs, especially from Women's Organizations themselves. Village Panchayats with active participation from elected women representatives can take important decisions on priority activities of drinking water, watershed management, improvisation of common property for the supplementation of fodder, fruits, compost-making, etc. It is the lack of policies at the Panchayats and the absence of driving, thoughtful force of the women-members, which may be regarded as impediments for progress and prosperity. Therefore, rural communities should be promoted to stop all degradation of natural resources of land, soil, water, biodiversity of flora and fauna and this can be ensured only if women are also partners in decision-making and framing policies. Women in local bodies can effectively control apathy towards the responsibility of guarding their own resources and build a leadership. This has been demonstrated time and again.

Jangal (1997) considers different roles for men and women in promoting organic agriculture. Available technologies, existing power structure and production costs and benefits have to be reconsidered with all actors of development, viz., government agencies, NGOs, corporate sector collaborating and promoting organic and sustainable agriculture.

Kalpagam, 2003, reports that Working Women's Forum (India) completed 25 years of sustained grass roots development efforts and is a pioneer in building leadership skills among women. Micro-credit assistance has helped poor women as leaders in their own right to influence public policy through collective action thus improving their social standing. Marketing by poor women of vegetables, etc., fishing economy, pension for beedi rollers, relief for agarbathi workers, change in silk-weaving men to give up liquor, etc. in three southern states have provided social security. Key women have been well trained. The "International Activist Award for 2003" has been given by the Gleitsman Foundation, California to WWF foundation President, Jaya Arunachalam.

This emphasizes how rural India can also be uplifted.

Shivashankar (1997) considers rural school to have a positive role and a mission to perform in building up an educated rural youth. He writes "Agricultural Education needs to be given a strong foundation with development of infrastructure facilities and human resources. It needs to be nurtured well with policy supports, adequate budgetary provisions and careful planning and monitoring at different levels with interventions from schools to post-graduate and Ph.D. stages. Formal and informal education by motivated, qualified personnel can boost and stabilize Agricultural Productivity and help achieve Food Security". For all this, the policies on Agricultural have to change with emphasis on agriculture, rural development and women as focal point.

An All-Women Panchayat at Jhajanu, Latur district in Maharashtra is an excellent demonstration of what women, even illiterate rural women, can achieve with good planning and leadership to help bring prosperity to the whole village in about four years. Women save money, handle cash, improve collection of property and water tax, educate more girls, follow family planning and regenerate wells. Now the Jhajanur men want this experiment to continue at least for another term. Thus, policy issues and implementation of decisions taken by women have set an example in India (The Asian Age, 2003).

In respect of promoting agriculture in general and organic farming in particular, women have an important role to play. It is known that women are responsible for producing 50 to 60 percent of food. What is to be reckoned is that they put in far more hours on the farm than their husbands. A unit of land may be ploughed and harrowed for 2 to 3 days and inter-cultivating the crop after sowing for a total of 3 to 4 days by the farmer while his wife would be toiling in breaking the clods, helping in sowing, doing the back-breaking operations of transplanting, weeding and harvesting the crop, followed by threshing, winnowing and cleaning the produce (see example in Table 2). The decisions of choosing the crop/variety, sowing-time and marketing happen to be the domain of male member who only shares 35 to 40 percent of total workload with his wife and pockets most money for his needs! It is expressed succinctly by the editorial of "Women in Agriculture" of LEISA INDIA, (Dec 2002) of AME foundation & ILEIA, that "Women are still restricted in their role as farmers by unequal rights and unequal access to and control over resources, especially land. In India, Nepal and Thailand, for example, fewer than 10 percent of women farmers own land…. Women, as producers, still remain largely invisible and unsupported". In India, though tribal women contribute 70 to 80 percent to the family labor in hilly areas due to seasonal male migration, their representation in local institutions and training is very low. Thus, women, particularly in rural India, have been deprived of their rights in all aspects.

India in recent years also experienced hunger and poverty though mountains of food grains of nearly 40 million tons remained in its godowns. Nearly 350 million are regarded as below the poverty line. The sufferers here are the women to a greater extent than men. This can be seen through the arguments further.

Joan Holmes (2003), the President of The Hunger Project, writes about the link between women and hunger and emphasizes that the greatest violation of human rights in the world is the subjugation of women and its greatest consequence being persistent hunger. "Famines grab our headlines, but they account for less than eight percent of hunger-related deaths. Chronic, persistent hunger, the silent day-by-day killer- takes 20,000 lives every day. Most hungry countries produce more than enough food. It is a human issue. It occurs when people are systematically denied the opportunity to earn enough money, produce enough food, get education, learn the skills to meet their basic needs, and have a voice in the decisions that affect their lives. When we speak of hungry people, we are talking about women and children. An estimated 80 percent of the world's refugees are women and children. There is growing recognition that subjugation, marginalisation and disempowerment of women are the fundamental cause of remaining hunger. <u>Yet policies and programmes have failed to incorporate this knowledge."</u>

Joan Holmes further links gender inequality to hunger in three respects viz.,

i. Neglect of women's well-being resulting in a cycle of under-weight and malnourished babies, married and pregnant as a teen-ager, denied health-care and education, when young and forced to work;
ii. Women as food producers being bypassed by programmes for agricultural development with only one percent of the land, seven percent of farm extension services and less than 10 percent of credit given to small-scale farmers and further by HIV / AIDS, an epidemic fuelled by gender inequality,

And

iii. Women not being given any say in decisions affecting issues of family health, nutrition, education and family income with no women's leadership.

Joanne Sandler, Deputy Executive Director of United Nations Development Fund for Women (UNIFEM) considers that in terms of gender supportive laws, the progress has been phenomenal with all necessary global agreements but we have far to go in terms of implementation.

UNIFEM specifically wants women's human rights to be discussed and the vast gap between policy and implementation be bridged (The Times of India, 27th June 2003).

At the grass root levels, several non-governmental organizations are keen to examine and actively help women and children in all spheres of activities. For example, The Society for Development of Women and Children (SODWAC) is improving the lot of rural women and children in the villages around Bangalore. Creation of awareness in health, nutrition and environment can lead to betterment of women in decision-making (Malathi Rao, Deccan Herald, 2003).

Women and Child Development Department sponsored programme "Stree Shakti" (Self Help Groups) in Karnataka State has earmarked Rs. 50 Crores to help about 75,000 Stree Shakti groups to help them take up income-generating activities such as dairying, organic manure, manufacture of ready-made garments, mat weaving and making of papads, pickles and condiments. Some groups have shown savings of Rs. 75,000 to Rs. 1,00,000. Principal Secretary to Chief Minister, Mr. K. Jayaraj and some officials consider that the purpose of empowering women's group with funds is that families don't fall prey to greedy money-lenders (The New Indian Express, 18th June, 2003).

In a quiet way, it is necessary to embark on special programmes and training to women, which can give them strength and confidence to improve their own lot and uplift the community as a whole. A massive programme has to be initiated to educate women on the need of understanding civic and social responsibilities for the desired change. Highly diversified activities have to be included so that "Farming" and not just "Cropping", which could become their means of earning livelihood without affecting the natural resources of soil, water, flora and fauna. Women have to gain insight into their avocations as well as market intelligence and access. The following are some of the suggested programmes to correct the Gender Imbalance in agricultural policy-making bodies.

1. Mass media and training programmes should cover the roles and functions of a Gram Sabha and how one can effectively participate in all activities, even at the Panchayat and State level meetings. Special T.V. and Radio programmes should depict live programmes of these local bodies and the print media should bring out the proceedings of such meetings with analyses of major issues and how they were planned to be solved.

2. Formal schooling and education would mean a long process for the already-deprived poor women. For them, special programmes related to running their own affairs along with some basics of learning have to be given.

3. Child labor should be completely eliminated as nearly 90 percent of the children working in rural areas are employed in agriculture and allied activities. The number of working children was 11.3 million. Article 24 prohibits child labor and Article 45 indicates free and compulsory education for children. Most of the problems arise from dropouts. These would bring a better future, especially for the female child.

Vocational educational programmes have to be formulated to school dropouts at the 7th or the 8th Std.

4. Self-help groups can be a big advancement for rural women to improve their earnings. These can build confidence to handle cash, men and materials required for running local institutions efficiently. Poverty reduction would mean greater participation in rural policy-making.

5. With induction and proper representation of women, the following self-employment programmes can get a fillip.

   a) Input management for organic farms for improving soil fertility.

      i. Production of compost
      ii. Production of Vermi Compost
      iii. Production of Green Manures / Green Leaf Manures
      iv. Production of bio fertilizers
      v. Production of Green Manuring Seeds

   b) Input management for control of diseases and pests

      i. Production of bio-control agents
      ii. Production of botanicals
      iii. Production of parasites / predators

   c) Establishment of outlets and market avenues to help farmers realize fair-price and help in fixing fare-prices for their produce. If the produce is ‘Organic,” establishing a certification process and initiating marketing process in local and export markets.

6. As policy-makers, women can change the whole lot of agricultural scenario in rehabilitating dry lands, plug gullies, establish water harvesting structures such as water-ponds and check dams, rehabilitate tanks through getting them de-silted with the participation of people and bring order in allowing limited and only essential bore-wells to be dug for common-use. Exploitation of land and water resources has to be prevented at all costs and this is feasible only through policy-makers both at the decision-making and executing stages.

7. Women as policy-makers can improve the lot of poor and help make rural development a reality with great participation from local communities and with the

utilization of allocation funds from the Governments / Panchayats equitably and economically.

8. Women in policy-making can gather strength by establishing local governing bodies and build suitable institutional structure.

9. Women can strongly curb the usually observed male dominant policy-makers against mismanagement of funds, power and good offices. Corruption can be kept at bay and good governance made the order of the day.

10. Women in power at the policy-making bodies however, cannot be viewed as panacea for every wrong-done so far but could be regarded as agents of change. The society needs direction, guidance and human touch to heal itself and this is feasible with reposing our trust in well-meaning educated women in policy-making bodies.

Table 2 Share of Labor (%)

Crop	Women	Men
Paddy	55-65	35-45
Ragi	60-70	30-40
Groundnut	65-75	25-35
Sugarcane	50-55	45-50

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Gender, Resources, Constraints and Strategies for Change in Asia's Agricultural Decision-making Bodies

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Deriving from STRAINATA's own experience in promoting Organic Agriculture, in this paper I first document the historical background of gender issues in (Ifoam-) Asian organic agriculture, the steps undertaken, the suggestions made and the difficulties encountered till now. Then I illustrate the general situation, how and why difficulties are encountered, dealing with gender issues, through a short introduction to the socio-cultural and political economic situation of Indian women in agriculture. Mostly women do not posses land and they have socio-cultural impediments to face. Their work is either unrecognised and/or falsely presented in national budgets and plans as also the fact that hardly any attention is given to the reality that there is a difference in the approach of men/women, particularly towards agriculture and its produce. It is recognised that attitudinal changes are required, the constitutional changes alone do not guarantee results. A few suggestions about what needs to be done in near future are also made. A strategy of networking is suggested and a project proposal introduced.

1. Personal Background:

STRAINATA has been working with small farmers and agricultural workers, primarily women and their children, in the villages of Medak District of South India for the last 12 years. Organizing these women and children into self-help groups, Training them in organic manure making, providing them small loans for sustenance, health and educational needs, has been its primary occupation, besides promoting organic agriculture.
STRAINATA has acquired some ground experience in organic crop processing, production and marketing for both sustenance and cash crops for small farmers and can make recommendations from farmer¡¯s and particularly women farmer¡¯s perspective. The regular documentation in its newsletters (Nr. 41 being the last one) gives an insight into its activities and organic agricultural (lifestyle) experience with black and red soil, irrigated and non-irrigated, sustenance and cash crops.

Strainata has been a member of the Standards Committee and Vice-President of the Association of Ifoam members in India (AMOI) as well as a Trustee of the Indian Organic Certification Agency INDOCERT in Kerala. It is also an associate member of IFOAM.

2. Historical Background on gender issues in Ifoam-Asia:

Strainata has been actively involved in the farmers and women¡¯s sections of a no. of national, regional and international workshops and conferences on Organic Agriculture: as an organic farmer at the national level workshop of Andhra Pradesh Council of Science and Technologies, at Hyderabad in Jan. 96, as a resource person on gender issues at regional level 3rd Ifoam-Asia conference at the Karnataka State University of Agricultural Sciences at Bangalore in Sept.1997, at regional level at the 4th ifoam-Asia conference at Tagaytay / Philippines in Oct. 1999 and lastly at international level as a speaker in the gender session of the 14th world congress of Ifoam at Victoria, Canada in Aug.2002.

The Bangalore Ifoam-Asia conference was rather academic in nature. It dealt with food security and small farmer¡¯s issues rather theoretically. But it was the first Ifoam-Asia conference where gender issues were discussed in one session. This was also the first time women from India, Philippines, Sri Lanka and Thailand decided to take the gender issue further.
Following proposals were presented by a group of women from Thailand, Philippines, Bangladesh, Sri Lanka, Malaysia and India to the General Assembly of Ifoam-Asia, Dec.1997:

* The equal representation of women in all decision-making bodies of Ifoam-Asia and its member organization as a goal. As an immediate affirmative action, the board of IA should have at any time at least 2 women members.
* Creation of a Committee on Women in Organic Agriculture.
* Organization of a conference on women in organic agriculture

However already during the Bangalore Ifoam-Asia General Assembly meeting, the discussions for a change in the ifaom-asia-statutes, to make it more farmer- and woman-friendly and democratic, were blocked by some office-bearers. This motivated some of us to strategise our approach for the next conference. We also decided to make the Philippine conference a *"people¡¯s"* conference (motivating presence of more farmers and not agricultural scientists only). The title reflected this sentiment. This trend has continued ever since.

The organisation of a working Group on Women and Organic Agriculture within Ifoam-Asia started. STRAINATA and a no. of women from Philippines (jacquline hassig-alleje/ Rizal diary, Vickee gracia-padilla/ agtalon, Juliet abunyawan/ food web and Angelina briones/ Uplib started discussing future strategies.

Because of a positive response from national level meetings, a national level workshop on Women and Organic Agriculture was organized by STRAINATA in Hyderabad in Jan.99. Extensive discussions around the following important issues took place:

* Do women have safe and healthy access to and control over resources of forest, water land, seeds, tools, technologies (organic farming) and skills?
* Do women¡¯s traditional skills in agriculture, caring for food and health requirements of the family and the community at large get proper recognition?

A series of recommendations were developed, which later became a part of the discussions and recommendations, which the session on gender issues in organic agriculture announced at the 4th Ifoam-Asia meeting at Tagaytay/ Philippines, Nov.1999:

* Allocation of funds to equip women of different strata with awareness, skills, technology and training on organic farming.
* Women¡¯s representation in major agriculture promoting agencies of organic farming viz Governmantal, private, NGO¡¯s, Ifoam etc.
* Representation of women in marketing boards and wage-fixing agencies.
* Allocation of funds for networking of women¡¯s organizations working with organic farmers.

At the General Assembly at Tagaytay Jacquline Hassig-Alleje of Rizal Dairy/ Philippines and myself introduced a no. of motions to change the statutes of Ifoam-Asia, which could make it more democratic, woman farmer-friendly and gender-sensitive.

We were defeated by a strong coalition from a coalition around some board members. However a working group on gender issues was formally made with the naming of chairperson and members etc. and the Tagaytay declaration itself did include women as a category:

"There is an urgent need to open wide the windows of opportunity to the farmers, women and indigenous peoples in order to expand their participation and membership in IFOAM Asia¡¯s decision making processes and structures¡¦ ¡°

After the frustrating experience at the Tagaytay Assembly STRAINATA decided to keep low and concentrate on field level work. Jacquline Alleje-Hassig of Rizal Dairy however continued with the discussions at the Ifoam regional and at International level and could motivate them for a pro-active program regarding gender issues.

The dialogue continued and STRAINATA recieved an invitation as a speaker to the gender session of the 14th International conference of IFOAM in Victoria / Canada.

The paper was well accepted and the Canadian study presented by Mr. Alan, University of Windsor, in fact provided the academic basis for my experientiell statements. A participant of the session and colleague of Alan, Veronika A. Mogyorody, Ph.D., Dept. of Sociology/ Anthropology,University of Windsor, wrote:

¡°... The section Alan presented was data we obtained from our telephone interviews. I'm currently working on material obtained from the 18 women I interviewed in our case studies. These were interviews conducted while working side-by-side with each woman on their farm for about a week. The questions were focussed on their attitudes towards the environment, marketing their products, the history of their farm, etc. I'd be delighted to be in your loop of organic contacts, and certainly part of IFOAM's group related to gender issues. I'll most definitely keep in touch and hopefully we can periodically bounce some ideas off each other.¡±

At the Victoria conference I was asked by some Ifoam-Asia members about our absence at Hangzhou and inspired to send a proposal to Ifoam International, which I later did.

Early 2003, on receipt of my project proposal, IFOAM International asked me to initiate and coordinate an e-group on gender issues and organise a lobbying training workshop. Funds were allocated from IGO-PSC. I was told that we could get funds both for the Lobbying for gender issues workshop as well as for starting an interest group on gender issues.

Later, due to a change in the organisational structure of Ifoam International, I was informed to concentrate on e-group formation and to organise a workshop on gender issues in Organic Agriculture. They said they were unable to find a Trainer for the Lobbying workshop.
Still later the project proposal was supposed to be tuned to the Asia specific needs e.g. gender imbalance in Ifoam-Asia board, but unfortunately even this proposal was later cancelled. It was criticised that we did not yet have enough committed members on the e-group and the sustainability of the project was not guaranteed.

Though seven women and seven men (names available) from Ifoam-Asia and the Ifoam world board Asian member did respond positively to the following questionnaire, which I sent to the e-group members, the communication in the e-group was supposed to be rather weak.

Questionnaire regarding workshop on ¡°gender issues in organic agriculture¡±:

- *Are you practicing organic agriculture?*
- *Are you an agricultural expert? scientist or farmer?*
- *Are you dealing with agricultural extension work?*
- *Are you involved in rural development?*
- *What are your observations regarding gender in agricultural context?*
- *What do you expect as the outcome of the first workshop?*
- *What could be your role and your contribution in the workshop?*

Unfortunately I have had to accept the reservations of Ifoam International. We do need to improve the situation at our end, i.e. in Asia. It is seven years, since 1997, since when the working group on gender issues in organic agriculture exists within Ifoam-Asia, but hardly any progress with results has been achieved. Also the mere presence of one alibi woman within the Asia Board will not help us further. Communication problems are symptoms of deeper conflicts, that need attention.

I am aware of the fact that due to non-availability of funds we are not able to move ahead. But interestingly this itself is a reflection of the general situation of women worldwide, that they have shortage of or no funds available for the work they are doing anyway. Moreover the decision-makers are mostly men without the sensitivity required for the urgency of gender issues and the few women decision-makers also do not always have the required gender sensitivity and/or have little say.

I give only 2 examples of how misunderstandings and unseriousness on the part of some decision-makers can block the progress of work on gender issues. The following interaction between the organisers of the 7th Ifoam Organic Trade conference at Bangkok, Sept 2003 and some gender group members, illustrates this:

"Feri G. Lumampao" of ¡°Gender and Water¡± project of FAO wrote:

¡°We have to make the organizers understand that the gender issue in IFOAM is not an icing but a major ingredient in the cake itself. How many percent of women are involved in the production, processing, packaging and trading of organic foods and products? The issue is not whether we participate or not, when do we hold it, how do we do it. I think and believe we should be part of the preparatory, conduct and post-conference activities of the organizing team in this IFOAM Trade Conference.

Who among the organizing team are gender sensitive or equipped with facts and figures on gender in IFOAM? If we are a minority, why? Is this the reason why the organizers do not take this as an important issue by not allocating funds, resources for this meeting? Just my single centavo contribution. I do not know the whole story but this is the same problem in water before, until the gender and water FAO program and network was finally born.¡±

ONG KUNG WAI, Organiser of the Trade conference, wrote:

¡°Don't know how gender sensitivity got into our discussion on fixing a meeting. From Feri's comments, I sense the attitude that you & your group are expecting funding support for your meeting and also management decision say in the event organisation and programme, just like that. And branding the event and organisers as insensitive and incorrect if you don't get things your way. I hope I am mistaken as I find such an attitute to be wholely unreasonable and absolutely out of line. If that is your group's politics, it would not be in IFOAM, the host organiser and the conference programe's interest to have your meeting alongside the IFOAM Trade conference¡¦.¡±

Again "Feri G. Lumampao" wrote:

¡°Thank you for reading ALL what I have written (not interpreting it) and giving your intelligent reaction. I was just trying to say that we come up with facts and figures and, in advocacy, even at the highest level of fora like the world summit and world forum, we always look for people who understands or are WILLING to understand our platform and work with them.
I NEVER had the intention to hurt anyone. In a discussion, we always see and hear both sides. I wish we have more like-minded people as you, so we can accomplish more important things and create ripples in the stream or waves in the ocean for the good of the majority who are NOT always represented and heard in big meetings and gatherings like the world conference.¡±

STRAINATA tried to mediate, but was not very successful.

The second example depicts unseriousness:

STRAINATA was invited to the Social Justice Session before the Trade conference by Laura, who was a member of the planning committee.

¡°Laura Lauffer <laural@blast.com> wrote:
Thank you for filling out the Social Justice and Labeling Survey- We will be presenting the results at the following meeting. Please let us know if you can join us- Laura Lauffer for the planning committee

* There is a limited cost-share available for farmers and participants from the Global South - Please contact : vitoon@greennetorganic.com , sasha.courville@anu.edu.au , or laural@blast.com for help¡±

Yet later Mr. Vitoon wrote to me, that there was no cash available for travel costs:

Similar is the situation with the rural women. They work in and for movements of farmers and have no decision-making rights.

The following statements (excerpts from ¡±Nature of Women¡¯s mobilization in rural India : an exploratory essay¡± by Madhu Kishwar (MANUSHI) in Economic and Political Weekly, Dec 1988) are made in the context of the movements of tribals and landless poor in Shahada, Maharashtra, of the struggles of landless field labour led by the Chatra Yuva Sangharsh Vahini in Bodhgaya, Bihar, the mobilization of landed peasant women by Shetkari Sanghathana, the Bhartiya Kisan Union, the Akali Dal and the CPI(ML)-led struggles of the landless poor and poor peasantry in Andhra Pradesh:

- *To create women¡¯s fronts within general movements is a necessary step to allow women to raise their own issues, but to try and involve women in decision-making and leadership process of the general movement is equally important and the two processes should be simultaneous as far as possible. (p.2763)*
- *The pressure of formation of women¡¯s wings rarely came from women themselves, they themselves did not pressurize the organization leadership to address itself to their specific problems as women, it came at the initiative of male leadership. (p.2757)*
- *women need to understand that it is alright and legitimate for them to work for their own rights, even at those points where they are not necessarily subsumed in some supposedly ¡°larger¡± interest. (p.2763)*
- *Most (rural) activists confirm that women, who are able to take active part in movements, are wives of men already involved. (p. 2758)*
- *Even women resist and are unable to identify with feminist leadership. (p.2758)*
- *The mass of women hardly participated in the night meetings, where the movement related issues were discussed and decisions taken. (p.2755)*
- *Women¡¯s entry into a movement usually brings with it a new inspirational quality. (p.2756)*
- *Any woman who admitted having been raped would be ostracized by the community, denied her maintenance rights in the family land and not even allowed to offer water or to participate in any ritual (p.2756)*
- *Young unmarried girls are seldom allowed to participate in meetings. (p.2758)*

- *Men play not a supportive, but a decisive role, reporting and assessing done mainly by men activists. (p. 2760)*

The basic questions that concern us today are:

* Why does gender-bias and gender imbalance persist in biodiversity, forestry, agriculture, watershed and other community resource management programs, whether initiated by the Government, non-government organizations or international agencies?
*What needs to be done at the Asian level?

Case Study Indian women:
Political context:

The Indian Govt. passed the 73rd constitutional amendment, mandating reservation of one-third of the seats for women in all village, block and District level bodies. Reserved Quota also applies for the post of chairpersons and deputy chairpersons in these institutions. However women in Panchayats (village parliament) have still to gain effective control over local resource management.

The Agenda 21 reinforces the concerns of the Third World Conference for Women (Nairobi 1985), enunciated in the Forward Looking Strategies for the Advancement of Women: the need for strategies and Govt. actions which would strengthen women¡¯s involvement in national ecosystem management and control of environmental degradation.

These concerns were reiterated in the Platform for Action, adopted with the Beijing Declaration at the Fourth World Conference on Women (Beijing, China 1995).

As a signatory and a major contributor to international agreements, India has a special responsibility toward developing gender desegregated databases on conservation practices, integrating gender analyses and perspectives into policies and programs for sustainable development and ensuring the equal participation of women with men at all levels of environmental decision-making.

Academic context:
In recent years the women¡¯s movement and academic research in South Asia have effectively asserted women¡¯s centrality in conserving biological diversity and managing local ecosystems and resources.

Researchers and activists have contended that the degradation of fragile ecosystems and the displacement of communities affect poor women in particular, together with young children and the elderly.

Such arguments and experiences from the field have helped gain national and international recognition for the significance of gender in resource conservation and sustainability.

Women constitute the major part of the labor force in subsistence crop production and are also the most stable labor force, as men migrate to distant locations for waged employment.

Resource Land:

Land is the source of sustainable livelihood, food security and poverty alleviation for almost half of the world population. An estimated forty-five percent of the world¡¯s populations still make their living from land.

In rural areas 86% of women are engaged in agriculture, especially cereal crop production and animal husbandry. In the secondary sector they work in husehold industries such as ¡®beedi¡¯ manufacture, leaf-plates making, cashew processing, coir products and processing of minor forest produce.

The development planners have argued that massive land reform is one of the key requisites to raise the income as well as living standard of the poor.

By resorting to appropriate land reform policies, countries like China, Japan, Taiwan, Singapore and Korea have consolidated their socio-economic position and recorded a remarkable growth in income-generation and poverty alleviation. It may be of interest to find out what role, if any, women have played therein.

India also accorded highest importance to land reform soon after independence from the British rule. Accordingly a total of 272 legislations have been enacted so far with regard to land reform and these have been included in the Ninth Schedule of the Indian Constitution, which has been amended 13 times till now in this process.
The exemplary outcomes of land reform in Kerala and west Bengal have shown that if there is a political will and determination, land reform is still the best approach to poverty eradication and economic growth.

However, it is rarely women, who own the land. And it is interesting to note here that the statistical data on the distribution of operational holdings and on land alienation and restoration among Dalits and Adivasis does not show the gender dimension.

In the north Indian state of Uttar Pradesh, the largest state area-wise, the UP Zamindari Abolition and Land Reforms Act 1950, daughters have no rights of inheritance, when sons are alive.

Widows come only after male lineal descendants and the widow¡¯s mother and the widow of a pre-deceased male lineal descendant in the male line of descent. The devolution of their acquired property will not be to their heirs, but to the heirs of the last male landholder.

Socio-cultural context:

The great reluctance to address the socio-cultural practices and gender ideologies that restrict women¡¯s autonomy, mobility and capacity to participate in decisions reflects the patriarchal framework and substratum of Natural Resource Management.

Unfortunately there are a series of constraints that have to do with the Asian belief systems and cultural practices. A plethora of taboos and myths prevent women from participating at various levels. In Bankura, West Bengal tribal women cannot take part in tussar cocoon culture, because it is feared that their touch would kill the larvae.
Some peasent communities do not allow women to handle ¡®sacred¡¯ paddy or ginger seeds. In

Northeast India some tribal groups say women must not use the axe or the spade and almost everywhere women do not use the plough.
A study done by the Indian Social Institute in coastal Kerala has noted, that concepts of purity and impurity are used by fishing communities to keep women from going out to the sea. The popular perception is that women are ¡®impure¡¯ (because they menstruate) and will contaminate the sea or the crops.

The largescale NRM programs continue to be premised on a sexual division of labour and responsibilities. Household needs for water, fuel wood, fodder, seeds etc. are characterised as ¡®women¡¯s needs¡¯. Men¡¯s natural resource and provisioning responsibilities are overlooked. Men are concentrated in the market-oriented side of the continuum of work and women in the statistically less visible, non-monetised subsistence production and domestic side; they account for 60% of the unpaid family workers and 98% of those engaged in domestic work.

Work context:

Work, for which no payment is received, include two categories of tasks:

a. *Tasks that are considered as necessary for survival but which are not included in ¡®economic activity¡¯ and in National Income of any country, e.g. a housewife¡¯s work.*

   UNDP Human Development Report for the year 1995 estimates that once a woman has a child, she can expect to devote 3.3 more hrs a day to unpaid household work, while her paid work declines by only about one hour.

b. *Tasks that are recognized as economic activity and which should correctly be included in the calculations of the National Income, but are often missed. These are tasks for which no payment is made when they are performed for the family such as kitchen gardening, post-harvest processing, feeding of farm hands or hired labor, livestock maintenance, gathering of fuel, fodder, water and forest produce, unpaid labor in family farm or family enterprise and so on.*

The continued unreliability and inaccuracy of data pertaining to work force participation of women denies their contribution to currently accepted definitions of economic activity by making it statistically invisible.

In an empirical study on the role of women in the Panchayat Raj Institutions in the Birbhum District of West Bengal, it was shown that a no. of factors hinder their full participation and their contributions, which have more to do with the social and educational parameters than with their own selves.

For example from the 65 elected Panchayat women members, of which most were in the age group 20-40 yrs, 55 were either landless or with minimum land (less than 2.5 acres), 24 just literate, 49 affiliated to the communist party CPM, the cmmunist Part (Marxist) of India.

Their level of attendance was low due to household chores and loss of daily wages as well as poor transport facilities, lack of interest and lack of awareness of their rights and duties as Panchayat members, political violence due to clashes between political parties were other hindrances.

A study of AME (Agriculture Man Ecology), the Bangalore based bilateral program between the Govt. of India and the Govt. of Netherlands, with farmers in the Chittoor and Ananthpur Districts of Andhra Pradesh, revealed that:

There is a difference in perspectives of men and women about farm and its utilization. The focus of men is on productivity of land and crops and their sustainability in the long run. Women¡¯s concerns are more towards day-to-day management of the farm, of crop activities and the physical labor involved, Men and women¡¯s concerns about the type of crops grown also differ. Women¡¯s primary concern from agriculture is achieving nutritional security while men concentrate on producing more for the market. They grow pulses and vegetables within the cotton or peanut crop, mostly without the knowledge of men, who concentrate on the cash output of cotton or peanut crops.
My own experiences underline these gender specific differences:
Gender issues in Organic Agriculture

I have been living and working with a rural family over the last 12 years. Like many other rural women, Sheela cares to grow some vegetables and spices on small patches in between the various crops we grow on our mutually owned 9 acres of black soil land. A part of our nutritional needs is taken care of. She tries not to spend too much of cash on inputs e.g. on labor, seeds, fertilizers, land preparations etc. Besides daily house-work, she does a lot of different type of agricultural work like weeding, transplanting, sowing, harvesting, threshing, winnowing, preparing for storage etc. on her own.

Her husband Chandu prefers to engage contract labor for the different types of work. He does, if at all, only certain types of agricultural work like tilling, irrigating, looking after the animals and finding labor and machinery required for the agricultural production. He would not do much of the work that Sheela does, the argument being -and this even the women believe in- that it is women¡¯s work. Also they, both men and women, believe in the difference in monetary recognition of the work they each do, men getting 2-3 times more than the women. Daily wages for men vary from Rs. 50,- per day to R. 75,- per day, whereas women¡¯s wages vary between 15 to 30 per day!

Rural women themselves say that men¡¯s work is harder and hence higher wages are justified. This is also the reason why they themselves do not want their men to undergo vasectomy operation. They fear their maleness will be affected by the operation. The women are generally quite lean and fragile and underfed and yet they undergo the tubectomy or the hysterectomy operations without any hesitations.

I realise again and again that gender is a class and caste-overruling dimension. Whether it is men belonging to the upper class or one belonging to the poor class and "backward" caste, the men have enough self-confidence to be able to assert them selves. I am really surprised at how confident even rural poor men behave in whatever they undertake, whether they have the cash available or not and whether they are knowledgeable about the subject they are dealing with or not. As against this, women tend to feel guilt conscious and become insecure at the slightest deviation from the goals they set for themselves.

Sheela goes around differently, more autonomously, with the agricultural work. She tries not to invest too much in inputs, she tries small patches of land with new crops. Last year she put turmeric seeds on a very small plot less than 1/4th acre and we replanted the produce on nearly 1¨ö acres without having to buy seeds. Similarly she grows many vegetables, chilies, spinach, coriander, brinjols etc. Also sunflower seeds in between or on boundaries of land. This gives yields, which can either be used for own sustenance or sold in small quantities daily in local market or to neighbors, to have some cash to take care of other daily needs.

She does not deal with big sums of cash, but she also does not make big losses. Lately she is collecting seeds and has started a small nursery.

Chandu keeps trying his luck by growing ginger, banana, potatoes, sugarcane and mostly it means big losses too. He is exposed to the trends in the village and listens too much to what other men, particularly the big farmers have to say. They like to talk about the big profits that hybrid ginger from Kerala State and the potato seeds from Agra city in U.P. could fetch, but not about the small farmers all over, who are committing suicide, due to heavy losses in cotton production and the like. Sheela is not exposed to many developments outside her home, but she is most concerned about the sustenance needs of her family.

What needs being done immidiately?

* Women need to be involved in decision-making in order to include their demands and their priorities in the national agenda. One of the three variables used in the formulation of the Gender Empowerment Index (GEM) is the relevant proportion of women in administrative and managerial positions (Human Development Report 1995). This index needs to be increased in agricultural bodies too.
* The Ifoam-Asia needs to change and democratise its statutes to accommodate this requirement.
* Gender sensitization and lobbying training needs to be done thoroughly.
* Ifoam needs to introduce more pro-active programs on gender.
* Women working in organic agricultural organisations, who believe that their presence in decision-making bodies can change the scenario to the benefit of women (and humanity) need to start a network. A suggestion for a project proposal is attached.

Sources:

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8 MANUSHI NO. 121, DEC 2000, P. 31
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10 HUMANSCAPE, APRIL 2003, P.24
11 HUMANSCAPE, MARCH 2001, P.12
12 project proposal "gender issues in Organic Agriculture" to IFOAM-IGO
13 STRAINATA Newsletters
(MANUSHI is a bi-monthly Journal on Women and Society issues from Delhi, well accepted internationally and HUMANSCAPE is a monthly magazine of the Humanist Movement of India, Bombay)

Appendix:

Example for a project proposal for networking of women in organic agriculture:

Women and Organic Agriculture Network (WON)

¡°There will be no food security without rural women¡±,
Jacque Diouf, Director General of FAO.

Dear friends,

We would like to invite you to join us to form a network of women, urban and rural, who live and work in rural/tribal areas, practice and promote organic agriculture as well as empower women in these areas. We, SST and STRAINATA have been catering to the needs of rural women in different Districts (Medak and Ananntpur) of the State of Andhra Pradesh in South India for over the past decade.

We are women, who have been actively involved in the Women¡¯s movements both at home as well as internationally. The course of our own lives has been very much determined by the fact that we are autonomous women struggling in a male-dominated environment.

We are also promoting organic agriculture as an alternative lifestyle, particularly for single women (men).

Recent developments like those due to the Globalisation and Liberalisation of Trade in Agriculture (WTO, AOA) have had adverse impacts for small farmers worldwide, more so for the women farmers and agricultural workers. (John Madeley, ¡°Food for All¡±, Zed Books)

As regards the food security aspect and the representation of women in agricultural decision-making bodies is concerned, the following statement of the World Food Summit in Rome in 1996, which is still valid, demonstrates the situation well:

The Rome Declaration on World Food Security and Plan of Action to combat hunger recognises that ¡°the limited access of rural women to productive resources and their restricted role in policy and economic decision making contribute to poverty and are obstacles to food security; that policies and programs in many countries pay little heed to equality between women and men and that the absence of gender dis-aggregated information and data prevents informed social and economic decision-making¡±.

In the Plan of Action they commit themselves to ¡°we will ensure¡¦equal participation of women and men, which is most conducive to achieving sustainable food security for all¡±.

Unfortunately even today farmers are generally perceived as male by policy-makers, development workers and agricultural services deliverers. The extension staff is mostly male, whereby the need for female advisors is being felt more and more.

More recently the International Federation of Organic agricultural Movements (IFOAM) recognised in one of its sessions at the 14th international meet in victoria, Canada in August 2002 that ¡°research (Univ. of Windsor, Canada) has shown that women have a special role to play in Organic agriculture. They found that most of the small farms practising integerated crop management and sustenance oriented farming (vegetables, trees) were those of women and most farms which were more than 2000 acres in area, using cash crops and mono-cropping were of male farmers¡±. (proceedings of the conference, 2002)

Since the Organic Farmers movement in India is not yet organized, lesser so the women farmers, and the marketing of organic produce still a big problem, most of us do not get the price we deserve for our produce, which generally is also lesser than that from chemical agriculture. This has also been one obstacle for us to promote organic farming, particularly amongst the small and women farmers. One other obstacle is the non-existence of training material geared to the specific needs of women.

With this background we, SST (Anantpur Dst., Andhra Pradesh) and STRAINATA (Medak Dst., Andhra Pradesh) have recognised the need of the hour and decided to

Initiate a Network of (women-led) NGO¡¯s and Individuals working primarily on ¡°Women and Organic Agriculture¡± issues.

Start a long term training program specifically for women farmers and agricultural workers in Organic Agriculture, based on guidelines given by National as well as International standards e.g. IFOAM / FIBL (Swiss Research Institute for Organic Agriculture).

Promote and actively contribute to the Gender Sensitization in agriculture e.g. the Initiative of IFOAM at the Asia level and later at the International level.

What we need:

1. An Office with Infrastructure (computer with internet connection) and a full-time administrator.

What we offer:

2. Training in Organic Agriculture for women farmers and agricultural workers.

3. Gender Sensitization of Agricultural Policy Makers in Asia and worldwide.

What you can do:

Join us in this initiative and help in whatever way you can.

Asha kachru, STRAINATA, Andhra Pradesh
Chandra kanjilal, SST, Andhra Pradesh

6th IFOAM-Asia Scientific Conference
"Benign Environment and Safe Food"
7th – 11th September 2004. Yangpyung / Korea

Gender Imbalance In Agricultural Policymaking Bodies

Namita Mukherjee
Society for Equitable Voluntary Actions

Women's position in any society comprises many different aspects, but public policy-makers concern themselves with only a small selection among those. Under the Indian Constitution, the State Governments are the main agencies for delivering welfare services as well as economic assistance to people. Therefore, schemes that deal with aspects of women's wellbeing mainly fall in their domain. The resources that the Central Government allots to such schemes are often routed through the State Governments for execution.
Provision for health services is a major head in the budgetary expenditure of every state. Among the many heads under the health budget, maternal and child-health as well as family planning have long been important goals of state policies and therefore, significant part in the health budget is always devoted to schemes for women as reproducers. On the other hand, other health services are designed for meeting the needs equally of men and women, boys and girls. Presumably the aim of all health policies is to generally raise the life expectancy of men and women; as overall chances of survival improve, women everywhere have an advantage over men. In West Bengal too, women's life expectancy at 67.2 years (as estimated for the years 1996/2001), now levels that of men at 64.5 for the same period (Government of West Bengal 1997/98, Table 1.1 Page 3).
However, the all India trend of a fall in the sex ratio of children in the age group of 0 – 6 years has also affected West Bengal. Table 1.1 below shows that though West Bengal has always been better off in this respect than India as a whole, its own sex ratio among children (number of girls per 1000 boys in the age group 0 – 6 years) has nevertheless been declining.

Table 1.1: Child Sex Ratios in West Bengal and India, 1997 – 2001.

Years	West Bengal	India
1971	1007	954
1981	981	962
1991	967	945
2001	963	927

Source: Census Reports 2001

Maternal mortality rates are a special concern for state policies since the state has schemes for giving some pre and post-natal care to expectant mothers as also some trained help at the time of delivery. During the 1990s, West Bengal's position was better than that of India as a whole, but worse than in most developed states. In 1998, the all India maternal mortality rate stood at 407 per 100,000 live births. For West Bengal, the comparable figure was approximately 266; but for Gujarat and Tamil Nadu, it was less than 100, and for Maharashtra and Haryana, it was between 100 and 150. For most other developed states like Punjab, Andhra Pradesh, Kerala and Karnataka, the figure was less than or equal to 200 (Central Statistical Organization 2000, Table 19b, Page 28).

In the field of education, which is the single largest item of revenue expenditure of the state of West Bengal, there are very significant gaps in the attainments of men and women. Employment for women is considered a major instrument of their empowerment. In West Bengal, the percentage of women in the labor force has always been relatively low in comparison both with men of the state and also with women in many other states, particularly in South and West India. Also, West Bengal's unemployment rates for women in both urban and rural areas were persistently higher than those of the men.

The relative lack of employment opportunities for women has probably been responsible for the prevalence of greater poverty among adult women both for the country as a whole and also in West Bengal as shown in Table 1.2.

The same exercise had also shown that there was relatively greater poverty among women in the age group 21 to 30 years, when women faced difficulties in taking up gainful employment. The other group more prone to poverty was of women past the age of 60 years, many of whom are widowed. Presumably, as compared to older men, older women were less likely to have earned a pension or accumulated property during their working lives since a much larger proportion of them worked in the informal sector or as unpaid labor for the family.

Table 1.2: Relative incidence of poverty among adult males and females:
All India and West Bengal, 1983 and 1993/94

Numbers	Title	1983	1983	1993/94	1993/94
		Rural	Urban	Rural	Urban
I.	India Adult Males	36.7	31.4	23.4	26.5
II.	India Adult Females	38.7	34.9	24.9	29.5
III.	% excess II over I	5.4	11.1	8.5	11.3
IV.	West Bengal Adult Males	40.8	28.2	18.0	20.0
V.	West Bengal Adult Females	44.1	33.8	21.5	24.0
VI.	% excess of IV over V	8.0	19.9	19.4	20.0

These figures outline the general condition of women in West Bengal at the end of 1990s, which obviously compared poorly with that of women in most other major states.

Public Schemes for Women

Since the report of the committee on the status of women in India became public knowledge, the state in India has accepted that there is considerable gender based bias against women in the

Indian society. Hence, governments at all levels have schemes that are meant to provide some special assistance to women and girls. These are in addition to the usual welfare giving public schemes that are available to all regardless of sex, race, creed and caste.

Several exercises on gender budgeting, including the exercise done by the National Institute of Public Finance and Policy (NIPFP, 2002) on the Union Budget, have provided lists of all schemes in the budget that are meant to benefit women. These have been further classified into three groups, viz.,

a. Those that are exclusively for women,
b. Those where women are to get at least a fixed percentage share, and
c. Those where they are entitled to share equally the benefits.

The exercise has further shown that the total allocation for schemes in category (a) form a minute part of the total share outlay; also that for schemes of category (c), the allocations between genders are seldom equitable. Women's share is not commensurate with their share in the population.

Aims of the State

Identifying the schemes and comparing their size with the total budget helps to highlight how the objective of enhancing women's welfare compares with other priorities of the state. But the states' objectives behind launching those schemes may not always be the same. Moreover, it is very likely that differences in the objectives behind different policies would end up having different effects on women's gendered position in the society and economy.

Hence, in order to focus on the nature of the impact of each scheme, there could be an alternate way of categorizing these women-prone public programmes; this classification would not only be more informative, but also help us to select the directions in which we need to get state policies to move. These three proposed categories are discussed below:

1. RELIEF POLICIES

Some of the women-prone schemes are meant to provide relief to specific groups of women in distress without inquiring into the reasons why they are in need of that relief and if, how long. Usually relief measures are for people who are adversely affected by some external and unexpected factor, such as, floods, drought, earthquake or riots. The aid was supposed to be temporary and when the efforts of these unforeseen calamities have abated, the victims are supposed to return to their original way of life without depending further on state assistance. Relief aid is not aimed of at solving any perennial or structural problem.

Many of the government policies for women, however, are by way of giving such temporary relief even when the problem is of an entirely different nature. For example, the Indian State has recently mooted a scheme for providing relief to destitute widows. But it has made no effort to deal with factors that have made widows, rather than widowers, particularly susceptible to poverty and distress. There is, however, considerable well-researched evidence to show that destitution among elderly widows is going to be an increasingly serious structural problem for India because demographic trends are towards more and more women surviving their husbands. And, it is a well-recorded fact that in India, compared to men, women have little or no property rights and their lifelong work is more likely to be unpaid or in the informal sector, where there is no old-age benefits. Therefore, the possibility of widespread distress among widows, particularly older widows, is built into the structure of Indian patriarchy. In an earlier study, we have seen that in 1993/94, in the age group of 60 years or more, 23.2% of women but only 20.2% of men are poor. Therefore, in today's situation in India, some temporary relief may be necessary for those widows, who are currently destitute, but only as a temporary palliative. The scheme does not indicate that the state is truly committed to the goal of gender equity. Those relief measures must be supplemented by actions to ensure that women's property rights are more clearly defined and enforced, and also that their unpaid and informal work during working age automatically entitles them to some old-age benefits.

2. GENDER REINFORCING ASSISTANCE

Particular policy measures may provide substantial budgeting resources for women but strictly for their needs in accepted gender roles. This category of gender re-enforcing schemes should include all schemes that are for women's reproductive functions. Even the fact that public resources for family planning are mostly spent on women is in recognition of that fact that women has always borne the entire responsibility for reproductive work and are, therefore, more willing to accept contraception. In making the policies women-oriented, the State also acknowledges the unequal nature of the pattern of gender construction prevailing in the country, where women are trained to be docile and yielding under pressure. Instead of trying to get men to share the burden with women, the State merely uses the images for its own ends. Similarly, government schemes for training women, orient them towards women's traditional skills without trying to get the access into non-traditional occupations.

Our argument is that providing help for women in their tasks of biological reproduction undoubtedly has to be the State's responsibility; but expenditure on these schemes should not be accepted as proof of the State's concern for gender equality.

3. EMPOWERING SCHEMES

The third category consists of schemes that are for removing particular gender-based handicaps for women in order to enable them to operate on par with men. According to Indian Constitution, the State in India is committed to ensuring that there is no discrimination practised between citizens on grounds of sex, caste, race or creed. Therefore, for every welfare scheme of the State, women are entitled to get benefits on par with men. In addition, the State in India has always undertaken some positive steps to remove the handicaps of traditionally underprivileged groups. By the same logic, it is also committed to executing some additional measures for removing the factors responsible for these gender-based handicaps of women.

Thus, there are two aspects to the empowering role of the State, viz.,

a. In the interest of equity, its schemes must stipulate that all men and women are entitled to partners in their benefits and any evidence of discrimination on gender grounds is punishable by the State machinery. We can call there schemes equity promoting. So, if for example, girls are barred from a particular course of education, this can be challenged as being unconstitutional.

b. For promoting true EQUALITY between genders, the State must make special efforts to locate and combat those factors that limit women's capacity to operate on par with men; these additional measures for positive discrimination in favor of women can be grouped together as equality promoting schemes forming category 3b. For example, public schemes for universal primary education are equity promoting, but these may have to be supplemented by projects to increase the number of women teachers, to build separate girls' toilets in schools, and perhaps also to provide childcare facilities for siblings. For promoting women's employment it is not enough just to women access to available jobs; it also needs projects to run crèches at available prices so that women can avail of the jobs.

Hence, in category 3 are included all the schemes that are welfare-oriented in a gender-neutral way along with others that address the specific problems that have so far prevented girls and women from enjoying those benefits.
These three categories are by no means watertight; a scheme can have more than one kind of implications for women. For example, that the State has focussed its family planning programmes on women, of course, reinforces the traditional gender-based docility instilled in women and uses it to serve the State's objective to population control. But earlier, women had to have the permission of their husbands to get an abortion or a ligation. When this requirement was removed, those same family planning measures became empowering, since women got full control over their reproductive decisions. What matters is whether the design of a scheme recognizes and in this way, provides for this autonomy of women. Similarly, public projects for bringing water and fuel within easy reach of households benefits women in their traditional roles of providing for such services to the household. To that extent, the scheme would reinforce the traditional division of labor within the household. But the measure saves them time and gives them scope for participating in other activities. And by making the task tight, it can help to reduce the rigidity of the traditional division of labor between men and women. The nature of any scheme can be altered towards greater gender equality my marginal supplements and modifications in its design.

In a given situation, women are in a greater need of schemes under categories 1 and 2, since they help to meet their immediate wants. On the other hand, bulk of the women-oriented has always been for the 3a category of projects, because, the standard assumption behind public welfare programmes is that, men and women would automatically get a share in proportion with share in the total population. Schemes specifically meant for removing the handicaps that prevent women from claiming that share, i.e., schemes of category 3b are hard to come by.

Mainstream State policies should be judged not just by looking at their relative costs and benefits for men and women but also by examining whether or not the policies can contribute, deliberately or otherwise, to bring about a greater degree of gender equality.

ILLUSTRATIVE EXERCISE

In order to indicate the relative dimensions of three types of women-prone programmes, we have listed the schemes included in the West Bengal Budget, Table 3.1 below summarizes the findings.

Table 3.1: Pattern of outlay on women-oriented programmes of Government of West Bengal 2001 – 02

Type of Scheme	Actual Outlay	% of Total Women-Oriented Outlay	% of Total Revenue Expenditure 1998/99 Govt. of West Bengal
Rs. In Millions			
1. Relief Schemes	326.350	1.43	0.14
2. Gender Reinforcing Schemes	1140.976	5.00	0.50
3a. Equity Promoting Schemes	21067.364	92.40	9.00
3b. Equity Promoting Schemes	266.402	1.17	0.10
Grand Total	22800.972	100.00	9.72

Source: Based on budget documents of the Government of West Bengal 2001/02

Table 3.1 shows that, even with very generous assumptions, the total outlay on women-oriented schemes could be assessed at any more than 10.0% of the total revenue expenditure in 2001-02, where it had actually fallen from 10.6 in 1998/99. Moreover, of this over 90% had gone to schemes where attitudes of policy-makers still reflected the earlier assumptions – that provided the State-makers a service commonly available men and women would automatically be able to draw their due shares of benefits out of the total. In other words, the allocations indicate little awareness of the special gender-based barriers faced by women in our society. On the other hand, schemes in category 3b, which were designed specially to promote true equality and to remove those barriers, had received only 0.12% of the outlay on women-oriented schemes. Incidentally, it is worth noting that this tiny amount allotted to this head was spread over as many as 31 different schemes, so that none got more than a token amount.

The next most important category within this group was of schemes, which reemphasized the given gender roles and therefore, reinforced those roles in the public image. Schemes included here were of two broad kinds: one was for women in their reproductive roles, as mothers and child-rearers. As mentioned before, though it is usual for governments everywhere to provide women with some amenities in their reproductive tasks, the State in India has long been using these schemes mainly for promoting child-welfare as well as for pursuing its targets for population control. The other schemes in this category were for training women but mainly in what are considered women's traditional jobs – Anganwadi workers and nurses. Little or no attempt is made to promote training for women in some non-traditional skills. We did find one such scheme viz., no. 31 in category 3b, where the training was to be tailoring cutting, an occupation that is traditionally male dominated in India.

There are only a handful of schemes for providing relief, and these are mainly for giving some handouts to widows, the old and the infirm. Compared to the numbers involved, the amounts allotted are pitifully small.

PUBLIC POLICIES FOR EDUCATION IN WEST BENGAL

As seen before, for West Bengal, education is by far the largest single budgetary head on revenue account and in the post-reforms period, the share of outlay on that head had been increasing. Let us examine how far the achievements on this function of the State were commensurate with these trends.

LITERACY RATES:

Table 4.1 below gives us the rates of male and female literacy in rural and urban areas of the State according to the last four decadal consensus. It shows that in West Bengal, even in the year 2001, more than half the rural females were illiterate. This was despite the fact that, during the preceding decade, the State had mounted a major campaign to promote “total literacy”. Those efforts were not totally washed since between 1991 and 2001, literacy rates among rural females went up by 50%, faster than the increase of around 40% that had taken place during the previous decade.

At the same time, the gap between male and female literacy ratios were being bridged fast during the past two decades because female literacy rates had been going up faster than the male ones. In comparison with the 50% increase in female literacy, the increase in the male literacy rates was around 25%. This tallies with the reports, that the total literacy campaign had generated far greater enthusiasm among village women than women.

Female literacy as well as gender gaps in literacy varies considerably from state to state. In 2001, gender gaps in literacy rates varied from 6.3% in Kerala to 32.2% in Rajasthan and female rate varied from 87.9% in Kerala to 33.6% in Bihar. It is possible that these variations are due to differences in levels of public expenditure on education in different states. Also, probably, awareness about literacy is cumulative; once a woman acquires it, she most probably will ensure that her daughters do not miss out on it. This may mean than over time, the influence of state policies would become relatively less important in determining the literacy levels.

We have made the above analysis based on the data of West Bengal. This is the State where a very progressive Government is ruling for the last 28 years under the Indian Union Government. After this minute analysis, we have arrived at the expected conclusion that discrimination in gender issues particularly in areas like health and education has been quite prevalent in our state. The Government has not been able to make any dent on the real problem as yet. It is clear that the administration is rather apathetic and indifferent to the situation. Let us now shift our focus to other areas of social life.

Let us examine the role of women in providing food. According to Food and Agricultural Organization of UNO, women produce between 60 and 80% of food in most developing countries and are responsible for half of the world’s food production. Of all the women who are economically active, 80% are engaged in the agricultural sector. Even in the agricultural labor force, more than 50% are female. United Nation’s Human Development Report, 1995, states that of all the poor of 1.3 billion, more than two-thirds are female. Rural women constitute more than a quarter of the world population. 500 million women live below the poverty line in rural world.

Women in India face a declining sex ratio – 1072 females per 1000 male in 1901 to 929 in 1991. Indian ranks 118th in the world in terms of the Gender related Development Index (GDI), which measures the achievements of women vis-à-vis men in terms of their basic capabilities. Sri Lanka is 70th and Pakistan 120th.

Women are the most deprived within a household scenario too. The household maintains and perpetrates women's subordinate position. To many, it might seem strange as to how the women in a family scenario can be poorer than men. This is due to patriarchal and hierarchical structure of the Indian household where a person's status, power and rights and responsibilities and control over resources are determined by their age and sex. How these factors affect women is also a function of their socio-economic, ethnic status, which is further divided on rural-urban basis.

BURDEN OF WORK:

In spite of this, the Human Development Report (HDR) postulates that out of the total burden of work, women carry an average of 53% in developing countries and 51% in industrial countries. The United Nation's Population Fund asserts that in Asia and Africa, women work on average of 13 hours more per week than men. Not only do women work longer hours than men, much of their work in not recognized and included in the national income accounts. The HDR puts women's invisible non-monetized contribution to the word economy to the tune of $18 trillion an year (around 50% of the current global output of $38 trillion). As long as women's work in not given due importance, her status will not improve. Much of the power a man asserts arises from the fact of him bringing home the dough and owning assets.

Women are involved in various stages of food production: starting from helping in preparing the field, sowing the seeds, weeding, harvesting till storing, processing, distributing, preparing the food and feeding the family. In spite of this, whenever, we think of agriculture or farming, the picture of a male farmer behind a bullock-cart ploughing comes into our minds. Most oif us are either not aware or choose to remain ignorant of women's contribution to agriculture. The word for farmer in Hindi is "Kisan" and "Raita" in Kannada and Tamil, both masculine. There is no feminine word for the lady farmer. She is always assumed to be the farmer's wife. Food production statistics also, do not fully capture women's contribution to food production, as it remains in the informal sector and for self-consumption. The Government of India's National Perspective Plan for Women admits the fact that "While the rural women have become marginally visible in the anti-poverty programmes, they have not been adequately recognized in agricultural development, land reform or rural industrialization".

Women and environment are often seen to share an embrionic relationship: both as protectors and preservers. However, this view confines women in their role as preservers of natrure, neglecting their economic role. It is very restrictive and simplistic to equate with subsistence activities and men with commercial activities. It is difficult to tell if this view of women as preserver of environment is due to inherent biological instincts or more a construct of social *norms. This divide is more a result of differing agricultural economics, which has been exacerbated since the rise of modernism, and come to be divided along gender lines.*

Women are also repositories of immense rich knowledge about nature. Unfortunately, their knowledge is not taken into account by the formal sector. Modern agricultural research does not attempt to document women's experience, their choice of crops, techniques of planting, storing, etc., thus foregoing any benefit and further work on it.

Government rural agricultural extension services are not targeted towards and do not reach the women. The policies also fail to recognize and incorporate the existence of female headed households, which are currently estimated to be 30 – 35% of all rural households.

Agricultural technology that is available today is all oriented towards making the man's task easier, and new knowledge have no place for women, with men taking over the jobs in those areas. Green Revolution, too, impacted differently on men and women. Women were assigned to low income, labor intensive tasks, such as weeding, harvesting and transplanting. They also lost out on a number of traditional areas of employment due to mechanization.

The biggest hurdle women face as farmers is the lack of ownership of lands and absence of title deeds. Without the security of tenure, women are unable to make the critical decision with regard to the kind of crops, inputs, loans, etc., and benefit from various associated facilities.

Women contribute directly to household food security by producing food for household consumption. They raise vegetables in kitchen gardens and livestock to supplement the family's nutritional needs. Other related activities of fuel and water collection take up considerable amounts of women's time. in some of Africa, women and children spend 8 hours a day collecting water. Moreover, it is widely accepted that (poor) women as wage-earners contribute more to the household budget than men. They also spend a large portion of their income on essential items for the house, like children's education, health and nutrition.

Nutritional status of women is dependent on both their economic and social status. It is common practice for the women in the home to eat the last, with outright discrimination against the girl child in favor of the male child. There are intra-household imbalances in food intake. This gets corroborated from an example in rural Punjab where 21% of the girls in low-income families suffer severe malnutrition, compared to 3% of boys in the same families. It is further observed that in fact low-income boys fare better than upper income girls. In the developing countries as a whole, only 20 to 40% of all women of child-bearing age, received minimum calorific requirement of 2200 calories or more daily.

Non-recognition of women as major players in productive sectors is the first hurdle to be cleared. Once their contribution is recognized, it will be difficult to ignore the voice of women in the decision-making apparatus.

So far we have discussed in very great details about the discrimination being mated out to women all over India, or even outside also. There have been efforts at various levels in the

Government and by the NGOs. But the achievements remain too little, too late. So there must be some fundamental reason for it. The cause lies in the policy-making levels.

Let us probe deep into the matter. The politics of the Indian peninsula has a peculiar commonality between its component states. Ms. Sirimavo Bandernaike had been the first women Prime Minister of an independent State. Pakistan had her lady premier in Ms. Benazir Bhutto. India had Smt. Indira Gandhi, and now Ms. Sonia Gandhi. Bangladesh has Shaikh Hasina and Begum Khaleda Zia. So all the four States had/have women as the highest policy-maker. But can anybody ever say that this helped these States to improve on the fate of the women there?

In the 3-tier Panchayat system, there is a strict provision for reservation of 33% seats for women candidates. This is being followed rather meticulously. But how far that has helped to change the situation even in a State like West Bengal, where a Marxist party is ruling for the last 27 years, the situation remains almost the same. But there is no lack of apparently strong and pious wish.

What happened when the heads of the Government were women? They were all along so busy and engrossed to keep their chairs intact, that they did not get any time to take up a long-term programme. And we have to remember that, women's issues were never on the top of their agenda also. So the matter remained where it was. But there is no denying the fact that political will and empowerment would be the right avenue to generate the results in the short and long runs. It is proven that no political party in India is ready to share power with women. The most progressive party in India, i.e., the Communist Party of India (Marxist) has no representation of women in their highest policy making body, i.e., the Politburo and the Central Committee. If this be the case with CPI (M), there is no point in talking about other parties and forums. In the previous paragraphs, whenever we talked of women as heads of Governments, it was basically a representation of dynastic rule. It was one head in most of the cases without the support of the body or limbs.

It will not be possible for me to suggest any immediate or quick remedy for this situation. But there are some silver linings in the cloud also. Let us elaborate.

We all agree that economic empowerment is the real long-term solution. Self Help Groups (SHG) have shown great promises in economic empowerment. We at Society for Equitable Voluntary Actions (SEVA), have experimented a new concept called "Organic Bazaar", where the women kitchen-garden producers were encouraged to participate directly in the marketing function, since we have seen that male members do not allow female members to come out of the household to sell the material directly. We wanted to ensure that the sales value should come in the hands of the producer directly. We have just started the programme and have to go a long way.

We have shown in this paper that gender inequality in prevalent in India irrespective of the nature and political philosophy of the respective state governments. We agree that representation of women in policy-making bodies is pathetically low in most of the countries, particularly, the developing ones.

After having agreed till then, we have to suggest some positive steps. We, from our limited experience, may venture to suggest the following:
Make the 3-stage Panchayat (Local Self Government) system more effective. These bodies have a compulsory representation of 33% women. Make them more vocal and decisive. It is unfortunate that they are still dictitated by their husbands or fathers-in-law or the local male party boss. Continuous training programmes will help capacity building.
Ensure similar reservation for women in other legislative bodies. The respective bills are pending before the Indian Parliament for long.
Encourage more women participation in India Administrative Service and other state administrative and judiciary services. The eligibility criterion may be changed to accommodate more women here.
Enhance formation of supervisory and watchdog bodies with women members drawn from various sections of the society.
Finally, keep on organizing sensitization programmes all over the country and at all levels of the society.

Let us remember that the journey of 1000 miles begins with a small step from the house.
"The wood is lovely dark and deep
But I have promises to keep
And miles to go before I sleep
Miles to go before I sleep"

ORGANIC BAZAAR A NEW CONCEPT IN CONSUMER – PRODUCER COOPERATION

Dr. Chandan Mukherjee, President
Society for Equitable Voluntary Actions

Marketing of organic produce remains a hindrance for its spread and propagation. The difficulties are from both the sides, i.e., producers as well as consumers.
The supply side problems are:

1. The producers are scattered, so that accumulation of marketable surplus needs extra effort.
2. Most of the producers have very small holdings. Therefore, the output is limited. The viable marketable surplus quantity has to be organized by special efforts.
3. All the producers tend to produce similar items, so that variety is lacking.
4. Many of the producers are organic by default and lack the basic marketing skills.
5. The middleman is not interested in treating organic produce in any different manner, While the organic procures at least expect a different treatment, if not a higher price.

Demand side problems as experienced by the consumers are:

1. The consumers are totally unaware of the existence and location of organic producers.
2. The consumers want to fulfil all their requirements from a single-point supply source.
3. Like-minded consumers are also strewn.

The fundamental thrust in any effort in marketing of organic produce has been directed towards export market.

India has emerged as a leading producer of organic produce. This has been made possible because of the country's intrinsic and inherent strength in agricultural activities. While a sizeable portion of the farming community practises traditional systems, the plantation industry like tea, coffee, spices has opted for the rule-based methods as propagated by organic agriculture (OA) experts. The Government of India (GoI), has finally woken up to the need of the hour. They have adopted National Programme for Organic Production (NPOP). NPOP has initiated accreditation and certification procedures. A national steering committee has also been established to overview and coordinate all the related activities. A very appropriate logo "India Organic" has also been designed and been popularized.

The various state governments have also jumped into the bandwagon and there is a race amongst them as to who will be the first or better in this move. The newly formed state of Uttaranchal has declared itself to be fully organic and they have established organic produce, commodities board. Madhya Pradesh has earmarked 3,300 villages where only OA practices will be followed. A government estimate declares that an area of 2,50,000 hectares of land is already under organized

OA production. The Khadi and Village Industries Commission (KVIC) has decided to open 15,000 retail outlets for marketing and distribution of OA products. Some such outlets are already in operation in the metropolitan city of New Delhi.

All the above efforts are directed towards the urban population or/and export market. Our endeavor is aimed at providing the availability to the rural or small town population. We believe that organic food is good for the health of the people and it should be promoted not only for commercial gains. We also believe that the producer has or should have the first right for consumption of the good material that he is producing. Our philosophy and conception received funding and knowledge support from the Institute for Integrated Rural Development (IIRD), Aurangabad.

Society for Equitable Voluntary Actions (SEVA) is engaged in rural development activities in the district 24 Parganas (North) in the state of West Bengal – a state on the Eastern side of India and sharing border with our neighbor, Bangladesh. The activity of SEVA spreads in about 35 villages in 3 blocks. SEVA has been propagating the concept of OA for the last 15 years and we are one of the old and active members of IFOAM. SEVA in the past had participated in a global comparative study between traditional, chemical and organic agriculture. We had always felt the need for offering marketing and distribution openings to the organic farmer and also wanted to make them involved in the marketing activities. The state of West Bengal has a very limited land area available for farming. The pressure on land is extremely high, resulting in a huge number of small and marginal farmers, most of whom could hardly afford the high cost of chemical agriculture. The task before us was to baptize them into the concept of low input agricultural practised with a simultaneous assurance that we shall provide the necessary support for marketing their production. OA being a highly rule-based system, the willing farmers were first trained to get into the habit of documentation. The land area available was so small that individual farmers could hardly afford to have their own Compost Pit. So the concept of Community Compost Pit was popularized. The availability of certified organic seeds being extremely limited, the farmers were encouraged to use native seeds from their own stock. The organization provided small amounts as interest-free loans to the needy. Close link was established with Bidhan Chandra Krishi Viswavidyalaya (BCKV) – the leading agricultural university in the state of West Bengal.

The demand side of the situation that is identification of the consumers was done as a parallel exercise. The local market committee was approached to let out the space required for operating the market activities. There was apprehension, anxiety and resistance from many. All this could be overcome through dialogue and discussion. The consumers were located and selected from amongst the local school and college teachers, people working in the various government offices, etc. The most striking observation that we noted was that most of the people were at least vaguely aware of the positive aspects of OA products. This has obviously helped our efforts tremendously. We have shortlisted 71 farmers from 9 villages. These 71 farmers are serviced by 6 Eco-volunteers on a day-to-day basis. Each of these Eco-volunteer is a creator of one Eco-club. The farmers attached to each Eco-club meet at least once a month to interact amongst themselves and SEVA's workers. 93 numbers of consumers have been shortlisted by these Eco-volunteers and they are regular buyers of organic produce. The Organic Bazaar is organized every Mondays and Fridays between 4 – 5:30 p.m. in summer and 3:30 – 5:30 p.m. in winter. All these timings and location has been finalized after a thorough discussion with the producer and the consumer.

The consumers have also put in their suggestions to decide on the production programme for the coming kharif season.

After having met some success wit the rural/small town consumers, we were invited to extend the facility to the city-breds also. Currently, 4 such market spots have been identified – 2 in the north and 2 in the south in the great of megapolis of Calcutta. Thorough discussion with the intending consumers is a prerequisite for starting a market spot. The leading organic farmers accompany SEVA workers along with their produce on every Saturdays. The spot is tastefully decorated to create an ambience of comfort, trust and pleasure. Creation of shopping malls is a phenomenon practised by big retail business houses to infuse the feeling of comfort and pleasure while shopping. The whole idea there is to divert the consumer's mind from the price aspect of the bargain and elevate the function of buying to the level of status symbol. We do not want to emulate the examples of the philosophy of shopping malls. But at the same time, we want to inject a feeling of déjà vu between the producer and the buyer. The classical economic theory says that the fundamental relation between the buyer and the seller is a contradictory one. But according to our philosophy, we want to replace this "contradiction" by cooperation. We believe that the relation between the consumer and the producer is of mutual dependence, i.e., one cannot live without the other. It would, therefore, be ideal if one party understands the other's needs and aspirations. Mutual trust has to be the binding factor. We are proud to say that it has worked very well.

The advantages of the system practised by us can be listed as below:

1. Absence of any middleman enables the price to be reasonable as compared to a normal market.
2. The farmers sell their wares in retail units to the individual consumers so that they are able to obtain a better per unit realization.
3. The small farmer is able to participate with his limited production abilities.
4. The produce, particularly, the vegetables, are plucked on the day of transaction, so that they are as fresh as they could be.
5. The consumer is able to express his views very clearly to the producer so that the latter could take corrective steps very fast.
6. Since the producer is able to monitor and estimate his demand potential, there is hardly any chance of any stockpile.
7. The pricing is arrived at through a process of mutual negotiation.
8. The price of the produce can be kept out of the normal market fluctuations, since hoarding and profiteering is not the driving force for the producer.

Needless to say, it has not been so much of a smooth sailing as it appears on a piece of paper. The basic difficulty or shortcoming is miniscule quantity of produce and varied nature of the consumer. We have just made a beginning based on the faith and believe that the journey of a thousand miles starts with a small step from your house. Our efforts can really bear the fruit if a thousand flowers can bloom.

Experience of Peermade Development Society in Organic Production and Marketing

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Abstract : The Peermade Development Society is one of the leading organisations in the private and non-government sector promoting organic farming in South India. The Society is implementing two major projects, Organic Spice Project and Organic Tea Project with the participation of small farmers. The produces are purchased from the growers on premium prices. Spices are processed on a contract basis in a private set up and exported to different countries. Western Europe is the major buyer of spice. A modern factory for processing spices is being set up under the Society. A new factory for tea has already established and the made tea is currently is marketed domestically. The project has helped to protect environment in a large area, produce quality spices and tea and improve the income of the small farmers.

The Peermade Development Society (PDS) established at Peermade in 1980 is a registered Non-Governmental Organisation (NGO) working for the integral development of the rural poor in India. The Society's activities are mainly concentrated in the district of Idukki and surrounding areas in Kerala State but not limited to this State alone. Idukki is the largest district in the State and also the most under-developed. The target group of the PDS is the small, marginal and tribal farmers.

Organic Spice Project

PDS has the rare distinction of pioneering organic cultivation of spices in India. This organisation started promoting organic farming since 1990 for environmental protection and sustainable crop production. A spice, being important crops of small, marginal and tribal farmers, a separate project for organic spice production was launched in 1997. Within a short period, the Society has won the acceptance and recognition of the farming community.

The important spices brought under the organic production are Black pepper, Ginger, Turmeric, Cardamom, Nutmeg, Clove, Vanilla and Grarcinia. Since the entire farm is converted coconut, cocoa, banana, mango, other fruit plants, vegetables and aromatic and medicinal plants etc. grown as mixed crops are also organic. The total production of various organic spices is currently estimated at 875.059 MT. The details of the farmers group and the break up of the organic spices are at Annex - I. The certifications covered are as per (EEC) Regulation 2092/91 and subsequent amendments, Bio-Suisse, USDA NOP and JAS.

There are all together 1667 small farmers under the Organic Spice Project. Of this 256 farmers are under Spices Board/Peermade Development Society organic farmers group and 1411 farmers belong the Peermade Development Society small farmers group.

Export: The maiden export was in 1998-99 to USA and Germany with 30.275 MT Organic Back pepper. In the year 1999-2000 besides Organic Black pepper, Organic White pepper and Organic Ginger were also exported and the total quantity was 63.425 MT. During 2001-02 it has been possible to canvass orders from a few leading buyers in Europe because of the better quality of our products. Export accordingly could be increased to more than two folds in this year and attained a quantity of 91.495 MT. The quantity exported in 2002-03 was further more at 106.89 MT and touched the highest level of 152.74 MT in 2003-2004.

The organic spices exported by PDS include Black Pepper Whole and Ground, White Pepper Whole and Ground, Green Pepper in Brine, Ginger Whole, Sliced and Ground, Turmeric Whole and Ground, Cloves Whole, Nutmeg whole, Mace whole, Rosemary whole, Thyme whole and Cardamom capsules. More varieties of spices are being brought under organic cultivation in a phased manner. Leading importers of Germany, The Netherlands, Belgium, United Kingdom, Switzerland and USA buy various organic spices from the PDS. As of now PDS is the largest exporter of organic spices from India. Currently organic spices are processed at Cochin in a facility owned by a private company, which process normally conventional spices.

Another organic produce marketed is Robusta banana. Procuring 2.850 MT, this business activity started in 1999-2000. The quantities procured were increased to 15.176 MT in 2000-01 and further to 21.364 MT in 2001-02. But in 2002-03 the quantity purchased came down to 7.309 MT. The organic banana was supplied to a processor at Cochin who converted it into freeze dried organic banana chips and exported to Germany as one of the ingredients of the breakfast cereal mix.

Many of our farmers cultivate coffee along with spices. The variety is mostly robusta. There is need to improve quality of coffee in production and processing. For making quality coffee beans there is need to establish modern curing units, besides training the farmers intensively. Export of organic coffee is yet to be made by the Society. Current production is estimated around 502.066 MT dried organic cherry coffee.

Processing Unit: The need to have a processing unit by the PDS for timely delivery and exclusively processing organic spices was felt not only by us but also by our buyers abroad. Hence the PDS is now setting up a processing unit for organic spices. The unit is located at Valanjankanam near Kuttikkanam in Idukki district. The unit when ready will have a capacity to process about 1000 MT of various organic spices annually. It will also have facilities to steam sterilise Black pepper, White pepper and also other spices like ginger, turmeric etc. Quality control laboratory will also be set up alongwith the processing facility to ensure the products to meet the specifications of the buyers.

Organic Tea Project

There are large numbers of small tea growers in Idukki district who experience serious economic problems due to unprecedented crisis in the tea industry. They are selling tea leaves at throw away prices to bought leaf factories because of very poor demand. In order to support this group of farmers and to revive their tea production an organic tea project was initiated in 2001.

There are 996 small farmers under Organic Tea Project. Total area covered under the project is 1110.87 hectare of its tea area is only 627.12 hectare. The currently estimated production of fresh tea leaves is 36,46,079 Kg.

To process organic tea the PDS has just now established a state of art tea factory with a capacity at Valanjaganam to produce 8,00,000 kilograms of made tea annually. The factory has a floor area of 60,000 square-foot and is one of the largest organic tea factories established in India. The European Union, Naturland e.V, Germany and Equal Exchange Ltd, UK have provided grant to the PDS in establishing the factory, the contribution from the European Union being the largest. Initially, organic CTC tea is being produced and in the next year Orthodox tea and Green tea will also be made according to demand. There are plans to make value added flavoured tea and tea bags.

Organic Certification and Internal Control System

Farmers are given intensive training before they are encouraged to enter into organic cultivation. The infrastructure of the PDS for promoting organic farming includes well-established training centre with residential facility with a team of experts, vermi-culture research centre and a unit for the production of bio-control agents. PDS helps for preparing superior quality organic manure from various kinds of agricultural wastes as a substitute for synthetic fertilisers. Cultivation of leguminous crops of seasonal or perennial nature is encouraged to take up wherever possible. For controlling pests and diseases, use of botanicals including neem products and bio-control agents in addition to mechanical control methods are advised. A Trichoderma is applied in the soil towards controlling Phytoththora foot-rot disease in black pepper.

For the past two and a half years PDS has also been training farmers on biodynamic farming and its practical application in tea production. As a part of it, preparation of compost, BD-500 (Horn manure), CPP (Cow-Pat Pit) and BD-501 (Horn Silica) are taught. Farmers have also been trained on the use of bio-control measures using bacteria and fungi such as Pseudomonas, Verticellium, Beuv eria bassiana, Trichoderma, Metarhyzium etc. in tea cultivation. Farmers are also trained to maintain farm diary to record the practices followed, inputs supplied and harvest data.

PDS has an effective Internal Control System for organic farming. As stated else where there are 1667 small, marginal and tribal farmers under Organic Spice Project and 996 small farmers under Organic Tea Project. The spice farmers are grouped under 31 units and tea farmers under 50 groups. Extension workers man each unit/ group. Twelve Regional Inspectors monitor the work of extension staff. Chief Inspector of the Internal Control System heads the whole programme.

While Skal International, The Netherlands inspects and certifies the Organic Spice Project; the Organic Tea Project is inspected and certified by Institute of Marketecology (IMO), Switzerland.

Advantage

The PDS believes in the economic growth of the small, marginal and tribal farmers through sustainable agriculture and organic farming. Towards this purpose premium prices are given to the farmers for the organic products bought from them. Currently the price premium works out to nearly 10% of the market price. Implementation of Organic spice ant tea projects has helped to protect the environment of Idukki and neighbouring districts, produce quality organic spices and tea and increase income of the small farmers.

Organic products, social qualities with equal and fair trade its constrain and future

Why organic farming is necessary.

In Pakistan most of large farms are run by absentee land lords, in this case land is cared by the workers, who have no feeling of ownership amount of production, margin of profit. On other hand small land owners, who are present on the farms have constraints of purchasing large amount of inputs associated with risk are forced to diversify their investments. To cover risks they usually reduce farm inputs but are not able to reduce environmental degradation like soil erosion, pollution, excess water input, water logging drainage, control of perennial weeds etc. Organic farmer pays more to the labours also controls his farm as well as off farm environmental costs. They cut production cash costs by putting family labour eliminate inorganic fertilisers, pesticide and herbicides and reduce soil erosion. Conventional food may contain carcinogens, chemicals that cause diseases including cancer. Additive in processing may further activate carcinogens. This food may contain nitrates and other preservative or nitrosamine which are potent carcinogen. Conventional farmer spent more on input of fertilisers, pesticide and these wastes goes to the environment specially ground water. This type of farming enters into industrial production processing and distribution system the whole chain of which adds some more chemicals. The cost of this industrial model for agriculture are phenomenal and extremely wide reaching, yet unrecognised as industrial production making use of more chemicals and machine produces food cheaper, better in cosmetic look and yet poisoned by chemicals. Organic farming has potential of niche markets for local high valued, non-conventional, indigenous and local agricultural products like medicinal herbs, traditional agriculture and non-timber tree products. Farmers trends to switch to organic farming is correlated closely with the size of conversion grants. The subsides for conventionally produced food currently limit the growth of organic agriculture to the size of market that is willing to pay higher price to the consumer. Although organic products and its market outlet are limited but premium prices may boost the market.

World picture of organic farming.

In 1989, subsidies were introduced in several European countries, like Germany, Sweden, Denmark, Norway, Finland, Austria, Switzerland, to encourage conversion to organic farming, which changed 376,000 hectares of land by 10,000 farmers into organic farming. In Germany where subsidies are available for two years so 7.9% of farm of farm and 3.6% land changed to organic farming.

In 1989 Europe is able to increase 200,000 hectares to 900,000 hectares organic farming. In Iran total 20,000 ha with production of 107,000 kg per year well adopted to social structure of family oriented activity. It is based on manual work, production and processing based on indigenous methods and animal manure is the main source of plant nutrition. In EU countries the number of organic farmer have increase from 6,000 in 1985 to 48,000 today. Italy have 30,000 certified organic farmers. In Scandinavian countries 8% are certified organic farmers. Australia has 10%, U.K 5% organic farmer. The total farm area in Pakistan 19.7 million hectares, which is 28% of the total area of the country. The average size farms in 1972 was 5.2 hectares. In Pakistan only few farmers are organic farmers. Ministry of Agriculture, fisheries and food in U.K pay support of 50 per ha per year for 5 years to convert to organic farming. Expected growth rate of organic farming in the World is 20-30% but organic agriculture will never be able to feed the rapidly growing world population due to low labour out put inspite of high yields. Due to over use of chemicals, land is depleted of organic matter and average production per ha decreases. Food produced in excess to demand serves to reduce commodity prices, received by farmer's but hungry people ill afford high priced organic food.

Organic agriculture.

Organic approach is to minimise the adverse impacts on the environments, by avoiding the use of materials from non-renewable resources, recycling where possible, use minimum amount of pesticides, avoiding the use of resources which cause pollution, relying on crop rotation, using crop residue recycling animal manure, legumes, and green manure, biological pest control, minimum tilth to be used to maintain soil productivity, to minimise the energy costs of production and transportation materials, to keep soil more fertile. Organic methods improve soil health, increase population of healthy worms, fungi and other soil organisms. Organic agriculture saves the land from losses due to erosion and soil degradation, improve soil fertility and enhances moisture conservation. Diverse varieties only be used under unfavourable conditions.

Organic farming is based on less inputs, better market demand due to having environmental and social concerns. It also based on local resources and technologies that provide farmer better independence and more control over their means of production. Environmental impacts of organic farming are:

- Improvement of soil biological activity.
- Improvement of physical characteristics of soil.
- Reducing nitrate leaching.
- Increasing and improving wild life habitant.

Organic farming in Pakistan.

Its objective are to develop low capital less labour intensive, higth yielding, better quality and healthy organic farming. Reducing the cost of production to minimum to achieve self sufficiency in all inputs. It is recognised as a long-term solution to the problem caused by nitrate pollution. Organic agriculture in the beginnings shows lower yields than conventional cropping but as its input are lower than conventional agriculture and labour in Pakistan is cheap, in long when organic agricultural methods have improved soil characteristics, soil fauna and established worm activity and large production of vermicasts, the yields will surpass the conventional methods.

Nutritional criteria of organic products.

People's choice of food is based not only on prices, taste, but also takes in to account, moral, religious and dietary reasons. Some even think in terms of exploitation of human and natural resources and degradation of environments. The organic food on the whole is nutrition and meets anatomical and physiological requirements of human. It also helps in interaction of food clean like production, processing, packaging and trading within the environment and the social structures.

Organic practising.

The organic farmers used garlic pyrethrum and neem to control pest and diseases, also use predators like Encarsia Formosa used to control green house, white fly and phytoseinlus persimilis a predator mite used for two-spotted mite control also get composts are a wonder producing by recycling garden and kitchen wastes. Mulch is magic and not help in suppressing weed but gives plants raised all macro and micro-nutrients, in chelated forms and vermicasts rich in nutrients and antibiotics. Biomass use as organic matter and also does the same. Crop rotations and inter cropping is designed to improve soil fertility. Organic matter composts and manures improve the soil health and thereby plant health to the extent that pests attack on crop is reduced and damage is negligible.

Animals and organic farming.

The organic farmer must work hard to integrate animals in to the farming system:

- The non-agricultural public must understand that organic animal husbandry is fundamentally better the kind of animal production they constantly criticise.
- Some livestock farmers also find difficulty to justify conversion to organic production, due to high restructuring cost and lack of premium prices to compensate for yield reduction and also reducing in the area for organic production rotational constraints.

Market trends.

Organic products have premium market which make not available to the whole population due to prices constraints. The prices of organic products is increased by factor such as: small scale production, widely dispersed farm, separate packing facilities more expensive recycled packaging and pricing policies of shops. Some consumers are ready to pay more for food that has superior quality. Consumer demand for organic products is gradually increasing due to concern about the environments and health implications of industrial agriculture although there is no relation between consumer and producer but the poor financial performance of organic farming reflects the financial problems of small farmers in some cases due to lack of access to premium market helps. Such difficulties have forced out from the business the small organic farmers. It is possible that organic farmers market their products directly but it requires more labour and organisation. Organic food are supplied to supermarket also provide home delivery. Seasonal production and regional markets remain an important objective in organic farming. We have to maintain National Organic Standards Board to decide the criteria of what is organic?

International movements (IFOAM) has formulated basic standards to define organic production. Food containing products of gene technology should be labelled, so consumer have an option, Bioethics influences the marketability of products derived from biotechnology. It is the consumers who decide on the prospects of biotechnological markets. Organic food should be labelled that consumer products not derived from genetically engineered varieties. Organic product must boost-out agribusiness, chemical-biotech corporation and giant supermarket chain. The most developed markets for organic food are Northern World.

There are 300 organic trade marks on the market. Organic label is common in 15 countries. Organic trade should strengthening the local communities for better social and environmental accountability, food security, conserving natural resources, control biological and cultural diversity.

Fair trade.

Healthy food and fair trade organisations accept the principal of external monitoring by labelling. Organisation are awarded label of approval. The Fair Trade based on equal partnership between the Southern producers, Northern importers, labelling organisation, fair trade shops and consumers these organisation work with the producer organisation. They produce to improve the ecological sustainability of production. It also provide protection to the new comers in this field, this will be helpful to the farmer's organisation to secure working capital, long term loan for investments, market information, communication, management, and technical support and assistance, but it also required guarantee that labelled products meet fair trade criteria. Fair trade can lead to environmental benefits.

Fair trade need fair and real cost covering prices for farmers all over the world but its products must be upto international standards in terms of quality and quality and must be accountable to the labelling organisation. International fair-trades help strengthening local economics. National fair-trades designed their own label and define the condition under which producers, trade and industry acquire the right to use the fair trade label in their commercial promotion. The fair trade rules exist for coffee, cocoa, banana, honey, sugar but royalties are imposed to cover operating cost when one uses these fair trade label. Certification either from fair-trade or organic Agriculture Movement produce confidence and trust. This protects the consumer's rights. Fair trade must provide social fairness, ecological responsibilities as pre-conditions, for sustainable production. It contribute to improve the living standard of economically disadvantaged small farmers to strengthening their self-governing organisation. Certifying organisation has devised special criteria for quality assurance, in-co-operaiton with the inspection organisation IMO (Institute for Market Ecology) and in accordance with IFOAM's accreditation programme.

Fair trade may have problem due to lack of management skill, private interest could be more than co-operative interest, market diversification into conventional, fair trade and organic market. Organic certification is slow, laborious and costly process and is a challenge to small producers. The price premium above the market price is insufficient, while inflexibilities inherent in fair trade model eroded a substantial part of the price premium. Fair trade movement is able to seriously challenge the social dumping that involves the exploitation of cheap labour and child labour.

Constraints.

- The barrier in trade are: restrictive trade policies perverse subsidies and bureaucratic regulations, integrating environmental factors are used to design better export strategies.
- Farmer's rights and protection of traditional plant varieties. Also trade related aspects of Intellectual Property Rights (TRIPS) under aegis of the General Agreement on Tariffs and Trade (GATI), must include farmer privilege. Small farmer have little access to information on World market prices, lack of transparency and politically inspired distortion, small farmer usually receive low prices for their produce. Farmer have insufficient information on improved technologies and scientific understanding of the process involved in their farming system, in efficient extension service. Under present unstable market conditions, procedure is not adopted according to the need of farmer's organisation.
- The factor responsible for market development are government fair and the sole of major super markets.

- Government price policies, monopolies on market of agriculture produce, causing low agricultural income.
- Organic agriculture requires time and well trained extension workers. Since organic farming is a new practice it needs competent and reliable management.
- Major problem is lack of public awareness of organic food.
- Development of viable producer and consumer linkages.
- Poverty alleviation, sustainable development, food security, agrarian reforms and appropriate technologies better farm management is needed.
- Due to lack of marketing structure, organic products are sold at the market rate of conventional produce. Artificial price structure bring disadvantage to consumer as well as producer.
- Organic farms spent more on labour for spreading manure. Organic farmer suffers due to high labour cost and labour scarcity.

Future.

- In future we have to check the economic market and policies in which organic products produce and marketed and check in the financial results which fluctuate by the resources, farm business, better management, labour availability.
- In future Government design better Trade regulation which are socially fair, ecologically sound and better standards for green and fair trade.
- Future we have to establish promotion and training programmes to foster export opportunities for organic products.
- Future attention should be given to meet the guarantee system that will ensure organic quality and allow consumer to develop their preferences for organic products with feeling of trust.
- In future we have to develop a practical and sophisticated monitoring procedure that is applicable to different farming structures and maintain international standards.
- In future need proper organic standards, rules and regulation.

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Opportunities and Strategy for Promotion of Non Certified Organic Farming in the Drylands of India

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Dryland covers about 67%area and contribute 48 % to the agriculture production of India. About 92% of the drylands will remain rainfed even after harnessing all possible sources of irrigation. Drought is a prevalent climatic phenomenon of these regions. Taking only annual crops is highly risky thus farming system approach has been followed in these regions since time immemorial , this includes diversified component e.g. crops, trees and animals. The philosophy of the traditional systems was to work in synergism with nature and use locally available natural resources . High input agriculture on the other side has not been found sustainable in drylands and use of synthetic fertilizers and pesticides is negligible. Thus organic farming, based on traditional systems and conservation of local natural resources with scientific knowledge can only be sustainable for drylands. Several natural endowments and high human and animal population in drylands also favors for organic farming. The need of integrated efforts of all related agencies to promote this non certified organic farming for efficient utilization of human and natural resources and socio-ecological betterment of the drylands .

Agriculture is a system of harnessing nature for the sustenance of human being. In pre-independence era, prior to usage of fertilizers and pesticides etc. agriculture was by and large organic and nearer to nature though at a very low population. Post independent era was posed with great population pressure on land, huge demands for food grains leading to increased use of fertilizers and pesticides to boost the production. To fulfill the forcing need of more food during last 4-5 decades,, campaign of "grow more food or green revolution" with technological interventions in agriculture widely adopted by farmers, to exploit the nature for maximizing agriculture production. Irrigation to cover rainfed areas, popularization of hybrids/ transgenic varieties and use of synthetic chemical fertilizers and pesticides were the major technologies and breakthrough to boost production level. This green revolution paid rich dividend quadruplicating food grain production from 50 million tones in 1950-51 to 211 million tones in 2001-02, which enabled India to become self sufficient in food grain. Second green revolution is also in offing to give boost to agricultural production and meet the requirement of 337 million tones by 2011-12. These developments simultaneously led to increased the use of chemical fertilizers and pesticides, causing serious damage to environment and human health. Besides, secondary Stalinization, decrease in soil fertility, resistance to pesticides in insects, increase cost of production are gradual effects, which are challenging the sustainability of agriculture production at high level(Balakram,2003).

A fast shifting trend from synthetic chemical based agriculture to organic and ecofriendly system of cultivation is being thought at national and global level.This shift towards organic production is getting support from the consumer who are aware of health hazards, therefore demand of food grown organically is increasing by 20-25% in developed countries where awareness level is comparatively high.

Organic farming is a production system which avoids the use of synthetically produced compound fertilizers, pesticides, growth regulators and livestock feed additives. To the maximum extent feasible, organic farming system rely upon crop rotation, crop residues, animal manures, legumes, green manures, off farm organic wastes and utilizes biological pest control, to maintain soil productivity, to supply plant nutrients and to control insects, weeds and other pest.

In a broader perspective organic farming is a holistic production/management system that avoids use of synthetic fertilizers and pesticides, minimize pollution of air, soil and water, and optimize the health and productivity of independent communities of life, plants, animals and people.

OPPORTUNITIES OF ORGANIC FARMING IN THE DRYLANDS OF INDIA

India is having versatile edapho-climatic conditions with several inherent advantages to adopt organic farming systems for economic and ecological betterment of the drylands. These marginal lands may not withhold with intensive farming practices. These can be perhaps tackled at low/optimum land production by using ample of biodiversity(Sharma1998). Possibilities of organic farming can be explored considering the following peculiar environmental scenario of the drylands-

1. Major part of the agriculture area in India is rainfed (67 %) and rainfall pattern is erratic. Average fertilizer use in these rainfed drylands is very low (36.4 kg/ha) as compared to national average of 76.8 kg/ha. In the arid areas fertilizer use is negligible(FAI,1998). Similarly pesticide use is also very low. This trend favors for early shift to organic system because of low or negligible residue of chemicals.
2. Due to climatic variability, farming systems in drylands are essentially diversified in nature with crops, trees, animals, grasses etc.. Interestingly this type of diversified systems have been found scientifically efficient in nutrient recycling and restoration of soil fertility which is the basic aim of organic farming. In these systems 10-30 trees/ha are available and 2-5 animals are reared by a farm family. This integrated farming system minimizes pest incidence as well as favors organic farming.

Table1 Growth of Animal Population in drylands (in millions)

Animal	1951	1992	1997
Cow	107.82	115.95	121.58
Bedfellow	30.45	77.46	97.56
Sheep	53.87	121.68	143.12
Goat	55.62	150.62	169.36
Camel	3.41	7.30	6.68

3. Rich traditional wisdom for restoration of soil fertility and control of pest further strengthen organic systems(Sharma and Goyal,2000). In the organic farming, integration of diversified component is used for efficient utilization of resources and the traditional farming systems of drylands can provide basic infrastructure for development of more efficient as well as higher productive organic farming systems in these areas.

4. Some of the plants like neem, pongimia, calatropis etc. are the best source of biopesticides are abundantly available in Drylands (Rajashwar Rao,1999). Similarly some of minerals like rock phosphate, gypsum and lime are available naturally in large quantity in Rajasthan. These minerals are found to be good for soil amelioration well as natural supplies of nutrients. Farming systems are dominated by animals and high population of animals are available with 1.5 to 2.5% population growth/year(Purohit,1998). Waste and products of this huge animal population can be a best source of balanced nutrient supply in organic farming(table 2). Thus in term of input supply the drylands are very rich, to support organic farming system in these regions.

Table 2. Nutrient availability/year in the excretion of animal and human being

Source	Excreta/unit / Yr (Kg)	Urine/unit/ yr(Liter)	Available Nitorgen(Kg)	Available Phpsphorus (Kg)	Available Potassium (Kg)
Cow	6000	2000	36	8	16
Bullock	8000	2500	44	11	23
Sheep/goat	500	160	26.5	3.6	6.3
Human being	110	400	14.3	8.9	7.7

5. High density as well as high growth of human resource (2.8% year) remains unutilized through out the year due to erratic rainfall and limited irrigation facilities. Enmass migration of human resource from villages to cities and nearby states for livelihood during

drought, imbalances the development of states falls in the drylands. Since in organic farming is labor intensive and input supply is made at local or village level thus there is ample opportunity for employment and proper utilization of precious human resource(Gupta and Sharma,1996).

6. In general soil of drylands are poor in water holding capacity as well as nutrient supply particularly in arid zone(Sharma 2000). These soils posses low buffer stock of plant nutrients The predominant sandy soils are poor in terms of water holding capacity and in some parts depth of soil is limiting factor for agricultural production. Addition of organic matter not only improve physical condition of soil but also make the soil to supply nutrient in balanced manner. Since organic farming is based on organic input supply ,these soil can be best utilized in organic system.
7. Desertification is a serious problem of drylands which is increasing at alarming rate due to over exploitation of natural resources, mainly because of use of inappropriate technologies for enhancing production in the prevalent edapho -climatic conditions of drylands environment(Dhir,1997). For example use of tractors increases wind erosion and damage natural regeneration of trees and grasses. Over irrigation in canal irrigated causing water logging ,salinity problem and malaria epidemic. Excessive pumping out of ground water has decreased ground water table drastically in tubewell irrigated areas. Soil salinity is increasing at many a places while soil fertility is decreasing at most of the places where intensive input supplied agriculture system is followed. Some of the severe pest of cotton, chilies etc. are becoming uncontrolled in these areas. These all are the indicators of desertification and timely need is to adopt ecofriendly farming/organic farming practices suitable for edepho-climatic conditions of the drylands.

PROMOTIONAL STRATEGY FOR ORGANIC FARMING IN DRYLANDS

As mentioned earlier that there is immense scope for adoption of organic farming in Drylands(Sharma,2001). Socio-economic and ecological reasons also favour organic farming in a large part of Drylands (Arora and Mohan,1986) .Endowments which are considered constraints for intensive agriculture system of green revolution can be converted into opportunities for development of organic farming in Drylands of India. Most of the part of the drylands is still categorized as “virgin” thus chances of promotion of non certified organic farming is more as compares to the areas where synthetic input based agriculture ahs been followed intensively.

Strategy of organic farming

1. **Popularization of organic farming without compulsion of certification** : In Drylands farmers are very poor and unable to afford the cost of certification. Promoting organic farming with the compulsion of certification has made negative impact on adoption. Thus promotion of non certified organic farming in terms of efficient utilization of local human and natural resources and for the local/regional market has been found and appropriate approach for drylands.

2. **Integrated efforts of supporting agencies:** There are several agencies of Govt. semi govt., NGO etc. who are working individually for promotion of organic farming. As individual agency many a time they may be either deficient in fulfilling the financial requirement or unable to provide holistic technical knowledge of organic farming. For example khadi & village industry(KVIC) have a scheme of margin money to establish vermicompost unit but they are unable to ensure the use of produce of such unit. Similarly agriculture department, ICAR(Indian Council of Agriculutre Research) institutes have wealth of information but unable to provide financial support. Thus there is need of integrated programs by all related agencies. Storehouses of technologies have to join hands with financial institutions to promote organic farming.
3. **Encouragement of decentralized input supply :** Encouragement may be given to produce all inputs for organic farming in a decentralized manner at local level so that not only local resources can be utilized but also employment at village level can be generated.
4. **Adoption of improved methods of composting :** In general farmers know importance of organic matter in the soils of drylands but animal and crop waste is applied in un-decomposed form in soil by the majority of the farmers in the drylands. This practice not only reduce the availability of nutrients to the plants but also invites several pest .It would be better to apply these material after composting them(Durgude et al.,1996) with any of the suitable method for farmer(table3). These methods can be popularize and financialy supported under the "*Clean village scheme*" of the several state governments.

Table 3. Nutrient availability in different types of compost

Composting method	Nutirent availability (kg/ton of compost) Nitrogen	Phosphorus	Potassium
F.Y.M.	7.5	6.0	12.0
NADEP	10.0	7.0	13.0
Phosphocompost	10.4	55.0	15.0
Biogas slurry	17.5	10.0	10.0
Vermicompost	27.0	17.5	17.5

5. **Awareness and capacity building:** Programs for demonstration of organic systems, training of production of organic input may be started at village level. Conferences, seminars, farmers fair may be organized to make a general consensus about organic farming.
6. **Certification of organic produce and market chain :** Facilities for sale of organic produce at regional and global market may be crated. Cost effective and easily available facility of organic produce certification may be made available and cost of certification should be meet by the exporters .
7. **Subsidy on organic inputs:** similar to the subsidy on fertilizers & pesticides, provision of subsidy may be made for organic inputs to make organic produce more competitive.
8. **Promotion of high value crop:** Dry climate of drylands favours quality production of several spices and medicinal plant having great demand at national and international level. Demand of these produce is increasing when grown organically, therefore these spices and medicinal plants may be organically promoted in the various agrocilmaitc regions of drylands (table 4)

Table 4 Potential high value crops for organic farming in different agro- climatic regions of Rajasthan

Agro-climatic zone	Rainfall Average (mm)	Suitable spices and medicinal crop
Arid	100-300	Cumin, Chilli, Fennel, Garlic, Senna, Guggul, Isabgol.
Transitional	300-450	Fenugreek, Cumin, Chilli, Aloe, Senna,
Semi arid	450-650	Fennel,Asvagandha, Fenugreek, Lucorice, Aloe, Aonla
Semi-humid	650-750	Turmeric, Ginger, Safedmoosli, Shatawar
Humid	More the that	Coriander, Safedmoosli, Asparagus, Asvagandha,

	750 mm	

9. **Development of organic cluster of villages:** Already available clusters of villages of watershed prgrammes (Khan,2002) may be converted into organic cluster of villages by providing technical support. This will be cost effective and make easier the certification process of organic produce.
10. **Promotion of lay farming :** In drylands, rotation of grasses and food grain is known as lay farming. This system is traditionally developed and scientifically revalidated by CAZRI for best option for fertility restoration in rainfed drylands(Muthana et al.,1985). Under the "*Marugochar Yojna*"(Grasland promotion project of Government of India) sufficient financial & technical support may be given to revive and improve this system.
11. **Research on organic system:** Although in ICAR institutes/ SAUs (State Agriculture Universities) , research has been done on various components of organic farming e.g. vermiconpost, biopesticides, biofertilizers agroforestry etc. yet the research is needed to integrate these efforts and assess their effects . Besides, following aspects of research may be taken simultaneously(Sharma 2001).

a. Survey and scientific validation of traditional organic farming practices.

b. Use of locally available resources for production of manures and biopesticides.

c. Assessment of economic and ecological returns from organic vis-à-vis intensive agriculture system.

CONCLUSION

Organic farming is a system of integrated use of nature friendly technologies for sustainable agriculture. Due to low rainfall and poor soils in drylands farming system based on synergism with nature has been following since centuries and there are immense possibilities to convert it in organic system with incorporation of modern eco-friendly technologies. All the supporting agencies and programs need to work together and creation of marketing facilities for organic produce of drylands, at regional and global level.

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ORGANIC MARKET DEVELOPMENT

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The word organic has got many definitions or multiple dimensions. Primarily by saying ‘organic’, I mean that it is natural. On the contrary inorganic means unnatural.

Now what I fell is organic market development is the concept which is impossible. It is the wrong coining of opposing ideas.

Organic is natural as well as ideal, but the market development is unnatural and idiotical.

How to decide which is natural and unnatural?

It is so simple, by observing nature, except man everything in nature are natural and every other life follows natural laws, it is only man can alter nature or violate nature. By doing so man draws rock himself. In such cases, whenever the reaction from nature is serious, whenever a condition arises where in life and happiness of mankind is threatened, he has to retract, he has to rectify. He has to get lessons by observing the behavior of other lives (which are the collogues, counter parts) in nature. By observing other animals or birds or bacteria’s even.

Such observations can surely reveal us that there is no market, no business, no profit motive, or even no agriculture in nature.

In nature every thing can happen without the help of any body. All creations and the food for all lives has been happened in its own. No life has got any ownership over nature. Each one get their part of food which is readily available in nature. There is no question of growing food by monoculture. As well as selling food as if he is the creator. Hence the statement, the market development is unnatural.

The natural organic concept can not go together with unnatural market development.

If you are organic, if you are convinced by the necessity of organic, if you can observe the defective and deficit nature, which is the after effect of inorganic, if you are broad enough to respect the rights of co-existing lives, if you have the wider perspective about happiness and purpose of life, it is impossible for you to develop organic market.

Organic concept should be international but not the market:

Our market should be simply local, exchange of ideas and items should happen locally, it need not be money oriented. Though the barter system has got some disadvantages, it is critical time for us to change natural.

In the name of organic if we try to develop international market, the environment spoils more and the situation becomes still worse. The very purpose of 'organic' fails.
Do you know what happened and what happens by business?

1) Business attracts money and accumulates wealth. The process leads to colonization. Which was happened earlier.
2) Money is not the matter to be eaten or worm. By business we will be converting natural matter to unnatural money, which has got any liquefying capacity in the world other than man.
3) The businessman mostly earns money without shedding his sweat. Food without work becomes indigestible. The money without work becomes invaluable. Undigested food creates all health problem and hence expenditure of money. Easily earned money has got no control over expenditure and hence destruction of nature.
4) Business involves handing, packing, transportation which needs external energy, extra time and technical support, which leads to extra utilization of natural research and unnecessary creation of pollution.
5) To develop a market (even though it is organic) it needs large-scale production of a single crop. It needs to satisfy a customer flock who are unaware of the problems of cultivation, who do not know the natural quality of the food.

   Because of such a market mentality different chemicals came into existence during 20th century to raise the yield and make the products attractive with unnatural colour, size and shape. With the same mentality it is impossible to replace the chemical food market by an organic items. It is analyzed properly the money oriented market mentality is the greater problem than the chemicals. If our wish is to produce more and to market more or to export more, it does not make much difference whether it is chemical manure or organic manner. Organic manure too in excess can become disease conducive and nature destructive. What ever may be the technology (whether it is organic or inorganic) if we expect high yield with large scale production then problem starts and the systems fails.

6) Making money and profit are the moto of market. It is very much difficult to have a market with service moto. The service oriented market is possible only if it is smaller market and nearer market where in we know the customers directly. We sell the products directly, we cannot dupe a person whom we know, because the customer and producer.As the market becomes distant and unknown, as every expenditure increases, as there is no binding of love, it automatically tends to adulteration. That is why more than 4000 food adulterants are there with us. At this point i full it is necessary to analyze the organic concept with some more perspective. Organic is not merely the replacement of chemical manure by compost or earthworm manner. It is not the replacement of pesticides by herbal spray. It is the way of life. Replacing the highbred seeds by the local seeds is very much necessary in organic farming, but only by this one cannot be said to be organic. It is the path of ideals.

(1) **Manual work:** It is said to be organic, if the organs are properly used, if our organs and also the organs of nature are properly used then it becomes organic.

We have hand and mind as greatest organs blessed by nature which no other animals most possibly doesn't have. The proper utilization of these precious organs have been forgotten by the new generation. One can be said to be organic if he works in his own farm with a cooling sweat. Only by direct work one can enjoy nature and analyze nature and understand nature. Then only one can apply his mind. Otherwise at every junction he needs expert opinion. Getting opinion from an expert is as equivalent to the non-coordination between the hand and mouth.

(2) **Diversity:-** Right from the smallest weed up to the biggest tree like banyan, all the greeneries are the working organs of nature. Every green builds the life loving, sustainable nature. Every animals helps in the process of plant propagation but the process is against in the case of man. Having and utilizing all the diversified verities of nature in every farm can make the situation organic.

(3) **Small scale and seasonal:** Every thing in nature happens in small scale and according to the season, even a biggest banyan tree or an elephant is infinitely small in comparison to nature. All natural manures have less than one percent nutritional content in it, as against chemical manner, which have minimum of 15% nitrogen in it. Because of this concentration, the

chemicals become hazardous. Look at any tree; it is made up of small branches and still smaller leaves. It is the small leaf does big work of building nature. It is the small cells, which make any animal. All of us eat in small quantity and grow very slowly. If we utilize the natural resources in small quantity and slowly, then only our nature does not become empty, and every body gets their part of food as well as other needs too. Because industrial revolution as we acquired a capacity to swallow more and fast, as we are capable enough to accumulate in terms of money, we have lost many.

(4) **To self-by self:-** self dependence and independence are the greatest requirements of any animals to be peace and proud. This contented condition can be considered as organic and it can be achieved only if one works own. Only if he produces his basic necessities in his farm. Only if he meets his food demand by the multiple varieties. Only if his purchase from out side reduces. Look at this organic situation, where in all work for themselves, no external inputs, no expert suggestions, all the demands can be met locally. In such a situation where is the necessity of selling and marketing?

In such a situation, there will not be any big cities. Now the cities and their pollutions and problems are growing because modern agriculture demands the unnatural and unnecessary inputs. In the organic situation 70% of the industries, cities and hence the marketing becomes obsolete (unnecessary).

Let us hope for such a condition, let us try to educate the people for such a situation and not to develop the bigger market.

So far what the operation formed by me is not theoretical. Though I have to achieve lot more, I am confident that my small achievements made me to talk here. And what I talk is self-generated and not supported by external experts.
Incidentally I have got a small farm extending 13 acars in a village near by Mysore city, which is situated to the south of Karnataka state belonging to the country Hindustan.

I live in the farm because I love farming. Because I do work organically in the farm, farming is profitable for me and it is profitable because I produce most of my necessities in the farm.

It is profitable because, I respect all the creatures of nature, it is profitable because I do not purchase anything for the purpose of farming.

I say I am under profit because I do not have any liabilities or commitments. I am not after any subsidies or helps from government. I am not worried about the pest and diseases or market fluctuations. I am least bothered about the techniques and expert opinions from the universities. I am confident enough to express my views and visions in any platform.

I have greatest wealth of nature, which includes more than 2500 plants species in our farm. We utilize more than 500 items in our food needs and we sell about 300 items to the very much local market. We prepare about 200 value added items without any chemical preservative, under the background of traditional techniques, like juice, jam, souse, pickle, dry fruits medicines etc., at our kitchen.

According to me kitchen is the greatest research station and cooking is the greatest education. Our research station need not be bigger than a kitchen. As we have already understood, anything big spoils the civilization.

I am profitable not because I sell these items, but because I grow these items I utilize these items I respect these items, I introduce these items.

I grow these items for the pleasure of growing, I grow these items in minimum proportion and also I know that I am not growing these items. It is the quality and capacity of nature to grow anything and everything; I just support the natural growing, I enjoy the natural growing.

I lift the weight not for competition. The weight used in the competition has got no other purpose other than competing. With such competition the body fails after some time.

Let us try to have a world where in no competition exists, and all get equal opportunities to exist.

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Status of Marketing of Organic Products in Mountain region of Uttaranchal, India

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Abstract : Marketing is often taken to be the same as "selling". Although selling is a very important part of marketing, in selling the focus is on the product. In marketing the focus is on customers.
Uttaranchal is a new state carved out from U.P. to address the needs of a hill state arising out of mountain specificities. In the case of Agriculture marketing hilly regions have remained neglected. Efficient market structures optimized the supply chain from farmer to consumer with adding significant value and mitigating risk to ensure the consumer gets the produce in the desired time, place and form. Logically, efficient market structures are complemented both by appropriate logistics and infrastructure, effective policy framework and by support services meeting needs for research, extension market intelligence, information and financing. Agriculture marketing comprises of all the operations involved in the movement of produce from the farm till it reaches the ultimate consumer. Several functions are involved in this process like assembling, sorting, grading, packaging, transporting, loading/unloading, storing/warehousing, trading, processing, financing, risk bearing and retailing. Various intermediaries between the producers to the consumers handle three functions.

The biggest challenge that the state faces is in terms of transportation and logistics. the terrain makes it difficult to have proper and cost effective infrastructures like road, storage facilities, reefer vans, pack houses etc. the transportation cost are high and access in limited. The mode of transportation is ropeways, horse carts; trucks, tractors and cost of transportation are high rendering the products costly in the market place. The more inaccessible the markets the greater are the number of intermediaries and lower the share of the farmer in the consumer price.

Despite having abundant resources and production of high value horticultural, medicinal and aromatic crops much of it goes waste for lack of proper post harvest and marketing infrastructures, particularly in the hilly areas. This coupled with poor availability of market information and other support services like input supply and credit etc. makes the farmers dependent on intermediaries. Quite often the farmer is not able to realize his cost of production.

Mostly farmers are very much willing to produce organic products. It is revealed in the study that 60% farmers are very much willing to produce organic products and j30% farmers are very much willing to produce organic products. Only 1% farmers are less willing to produce organic products. The study shows that 50% farmers are involved in organic farming since 1-2 years only. All the farmers grow rice and wheat as major crops and only 50% farmers grow sugarcane.

The extent of adoption of Indian Organic Food Standards is more than 80% by mostly farmers.

The 50% farmers supply their products in other markets not in local or in mandi. Most farmers get additional prices for their organic products. This is analyzed by the study that 70% farmers get additional prices for their products.

The study reveals that producers' use organic manure (trichoderma, pscudomonas etc.) in their field. They follow IMO Standards strictly and the quality of their products is controlled by IMO. They follow IMO standards in production and processing too. They use admitted practices for different activities, which are admitted by IMO.

The study also shows the problems, faced by farmers for producing and marketing organic products. Mostly farmers face the problems related to production, storage, marketing and price level of products.

Another section of interview schedule shows the preferences of farmers regarding organic farming. Mostly farmers prefer organic practices for different activities of growing and marketing of organic products. The awareness scale shows that mostly farmers aware about organic farming, certification and organic standards. They are aware of the practices and substances, which are admitted and prohibited for organic farming, but not fully aware.

Low cost of certification, improvement of marketing system, setting of efficient input supply system, strengthening the awareness level of people about organic farming and conducting training programme for farmers, are the important policy implications emerged from the study for marki9ng organic farming system more remunerative to the farmers and strengthening marketing system for organic products.

Introduction

Marketing is often taken to be the same "Selling". Although selling is a very important part of marketing, in selling the focus is on the product. In marketing the focus is on customers.

Uttaranchal is a new state carved out from U.P to address the needs of a hill state arising out of mountain specifications. In the case of Agriculture marketing hilly regions have remained neglected. Efficient market structures optimised the supply chain from farmer to consumer with adding significant value and mitigating risk to ensure the consumer gets the product in the desired time, place and form. Logically, efficient market structures are complemented both by appropriate logistics and infrastructure, effective policy framework and by support services meeting needs for research, extension market intelligence, information and financing. Agriculture marketing comprises of all the operations involved in the movement of produce from the farm till it reaches the ultimate consumer. Several functions are involved in this process like assembling, sorting, grading, packaging, transporting, loading/ unloading, storing, warehousing, trading, processing, financing, risk bearing and retailing. Various intermediaries between the producers to the consumers handle these functions.

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Despite having abundant resources and production of high value horticultural, medicinal and aromatic crops much of it goes waste for lack of proper post harvest and marketing infrastructures, particularly in the hilly areas. This coupled with poor availability of market information and other support services like input supply and credit etc. makes the farmers dependent on intermediaries. Quite often the farmer is not able to realize his cost of production.

There is now a trend visible where consumers are increasingly demanding “natural” products (ranging from foods to textiles) and retailers are increasingly supplying such products.

The market share of natural products should not be over estimated.

Firstly a distinction has to be made between northern Europe and Southern Europe. In the Northern Europe, particularly there is an increasing demand for natural products.
Secondly, one needs to distinguish between the marketed organic products. Some of organically grown fruit have experienced good sales growth in the last few years, reaching a market share of some 8-10% of the fresh fruit market. On the other hand, there are also clothes made of organic cotton.
For these products there is loyal but a very small niche in the market.
Important thing for the acceptance of organically produced product is that the consumer price may not be too much higher than that of traditional agricultural products. Past experience has shown that, while the costumer is willing to pay a little premium on the average market price, too a large a difference will lead to consumers shying away from organic products.

Indian opportunities

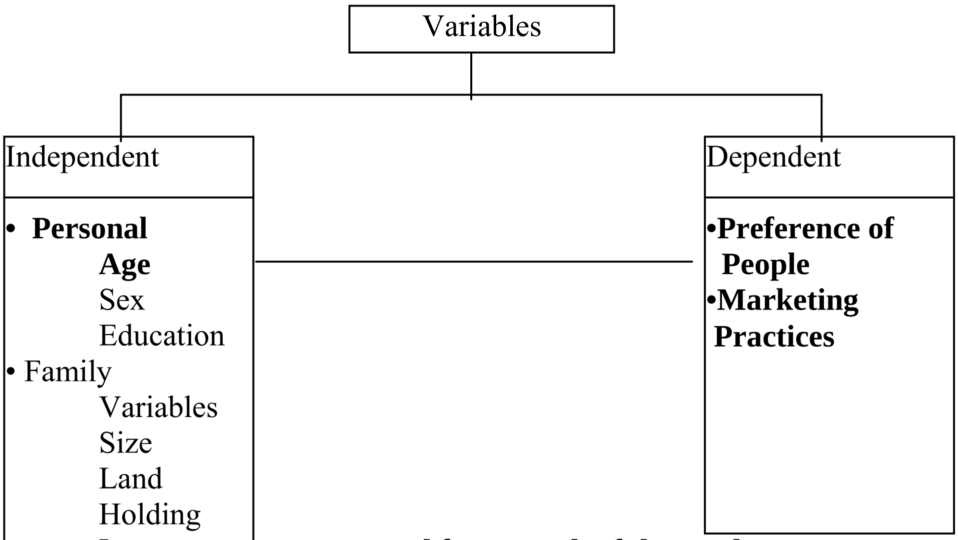
The past fifty years have witnessed the biggest changes in the Indian agriculture sector. Through the gree revolution and principles of intensive agriculture, we could attain food sufficiency. But we have achieved this food safety at the cost of our environment. Even after having the largest arable land in the world, and twelve e months of sunshine and being the second largest producers of fruits and vegetables, we are nowhere in the agri-business map of the world. Indian exports of organic foods, at present, are only worth around $0.32 million. By fixing minimum support prices for more and more crops we have made the quantity of produce a measure of success at the cost of quality. The result is the lack of incentives to bring quality produce to the market. At this juncture India has to think in a different way to position itself in the world agri-business market. We should study our own strengths. One such area, where India has strength, is the field of organic agriculture.

Agriculture in many parts of the country is naturally organic, the reason lbeing the high cost of pesticides and fertilizers. So there is no need of conversion to organic agriculture. The fertilizer consumption in India is only 69.66 kgs. Per hectare and pesticide consumption only 600 grams per hectare, which are well below the world averages. Manual weeding is a practice still followed in different parts of country. Cheap and easy availability of labor also suits India to the labor-intensive organic cultivation.

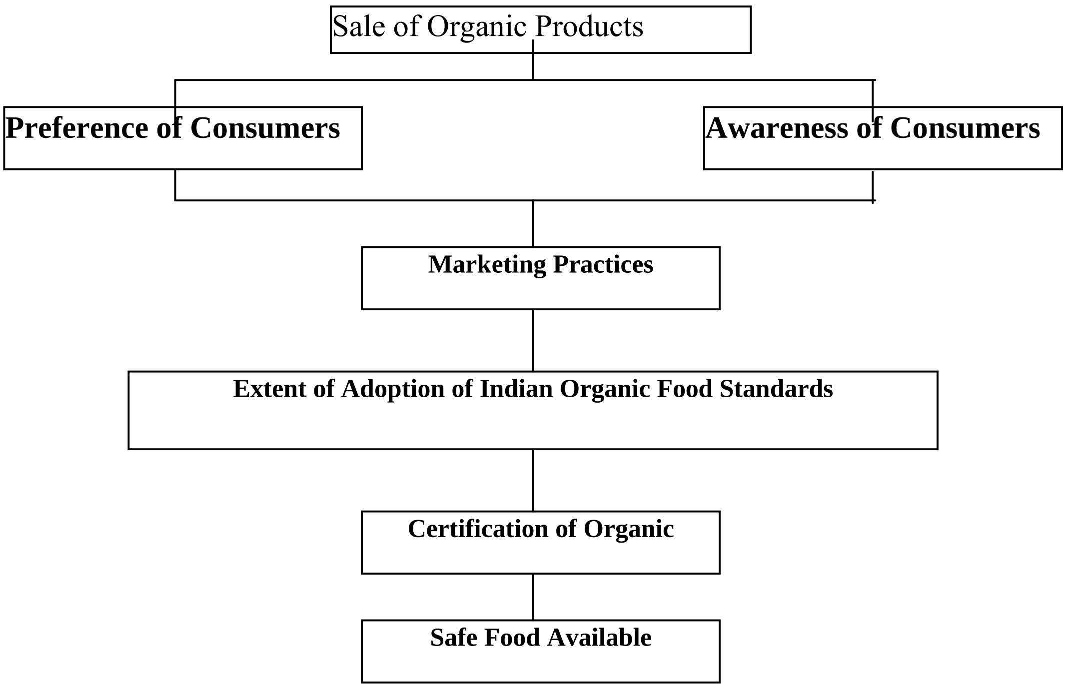
Research Methodology

A descriptive cum exploratory research design is chosen. The data is analysed and relationship between variables is also analysed.

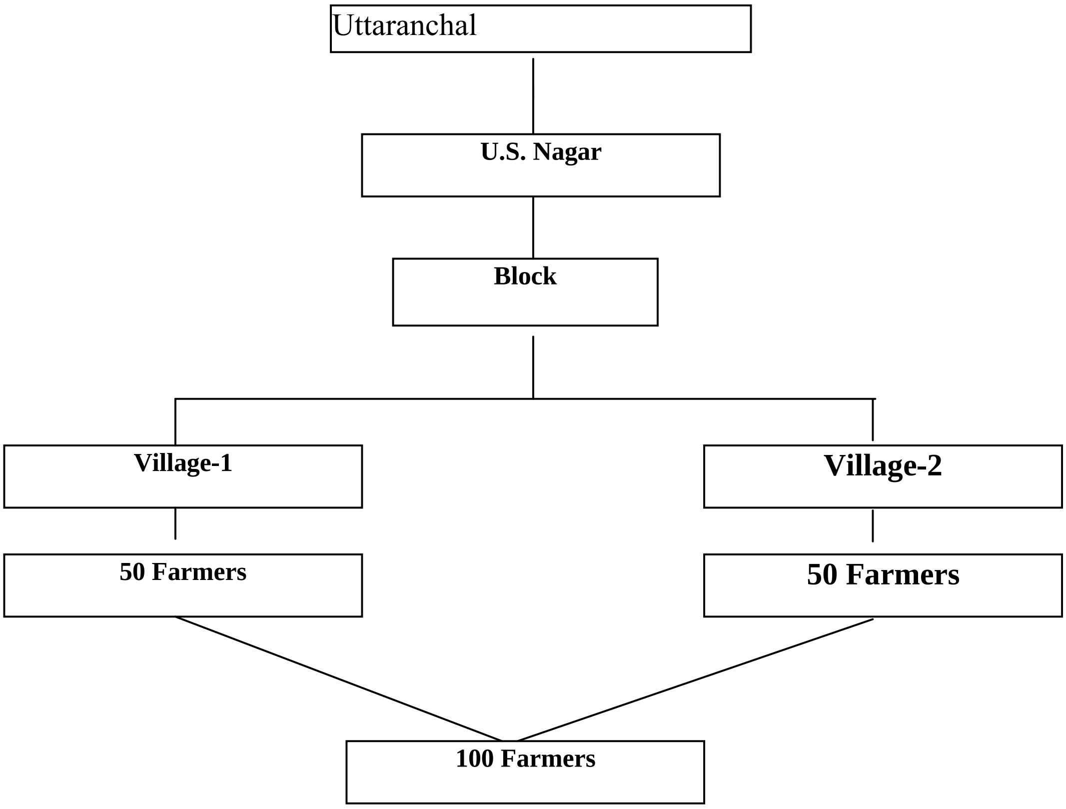
Schematic Presentation of Variables



Conceptual framework of the Study



Sampling Design



Subjective Statistics

1. **Frequency**

   It is used to find out the numbers of respondents in a particular cell.

   Frequency = Sum of responses (in numbers)

The following techniques were used for subjective statistics.

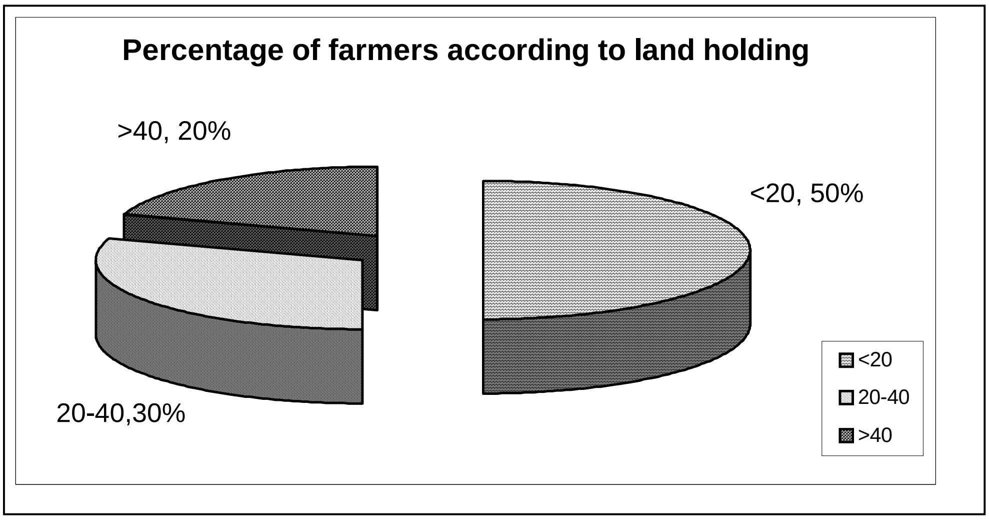
2. **Percentage**

It is used for making simple comparison.

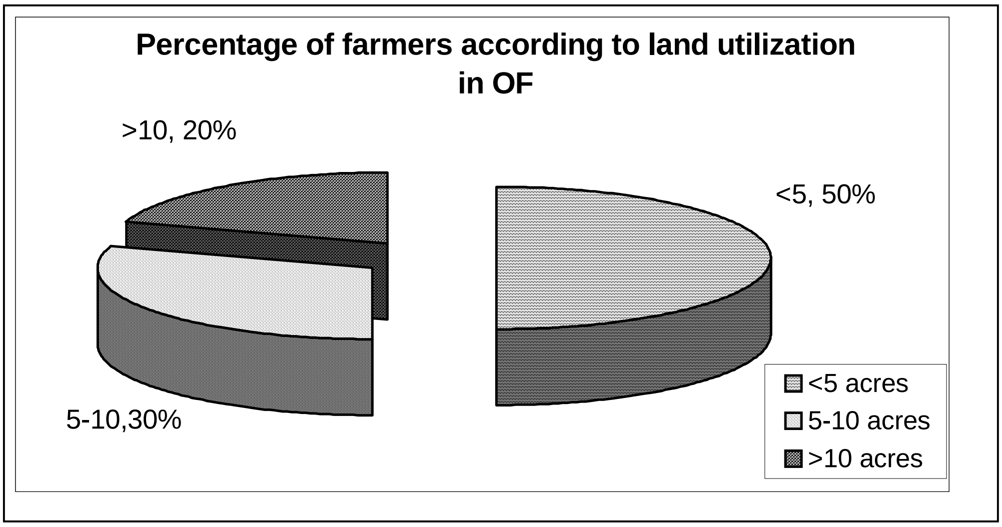
$$\text{Percentage} = \frac{\text{The summer of all the responses}}{\text{Total number of all the responses}} \times 100$$

Results and Discussion

The graph shows that 50% farmers have less than 20 acres land holding and 20% have more than 40 acres land holding size.

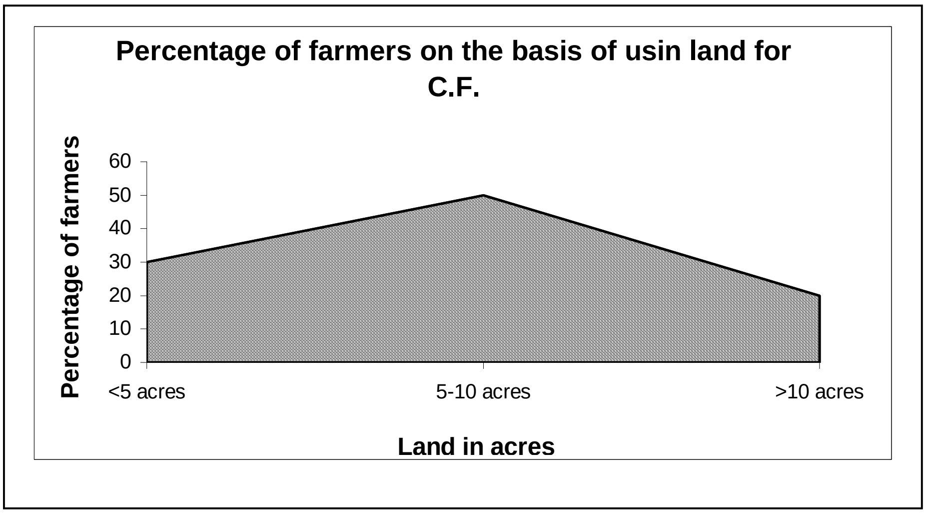


The pie graph shows the percentage of farmers who use different category of land area for organic farming. It shows that 50% farmers are utilizing less than 5 acres land, 30% farmers are utilizing 5-10 acres land and 20% are utilizing more than 10 acres land for organic farming.



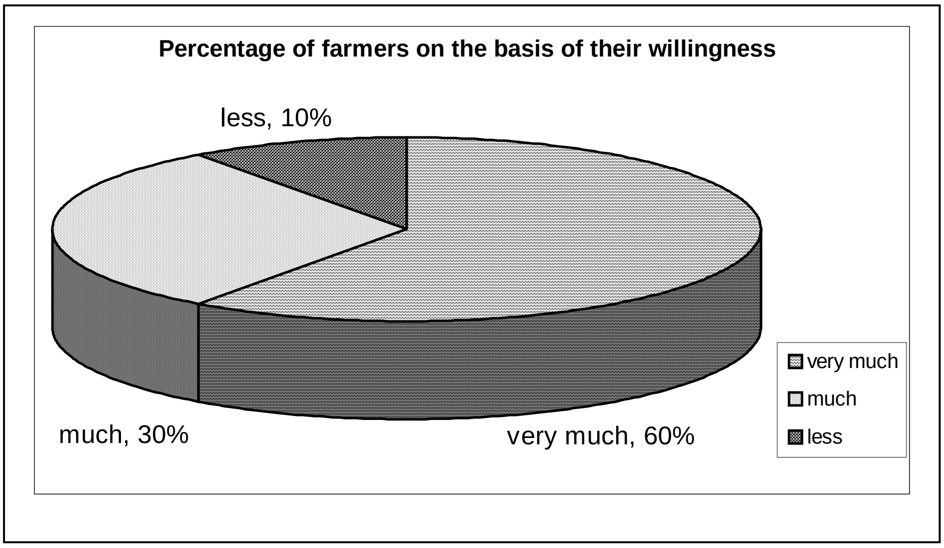
Land utilization for organic farming

The pie graph shows that percentage of farmers who use different category of land area for conventional farming. 30% farmers are utilizing less than 5 acres land for conventional farming, 50% are utilizing 5-10 acres land for conventional farming and 20% are utilizing more than 10 acres land for conventional farming.



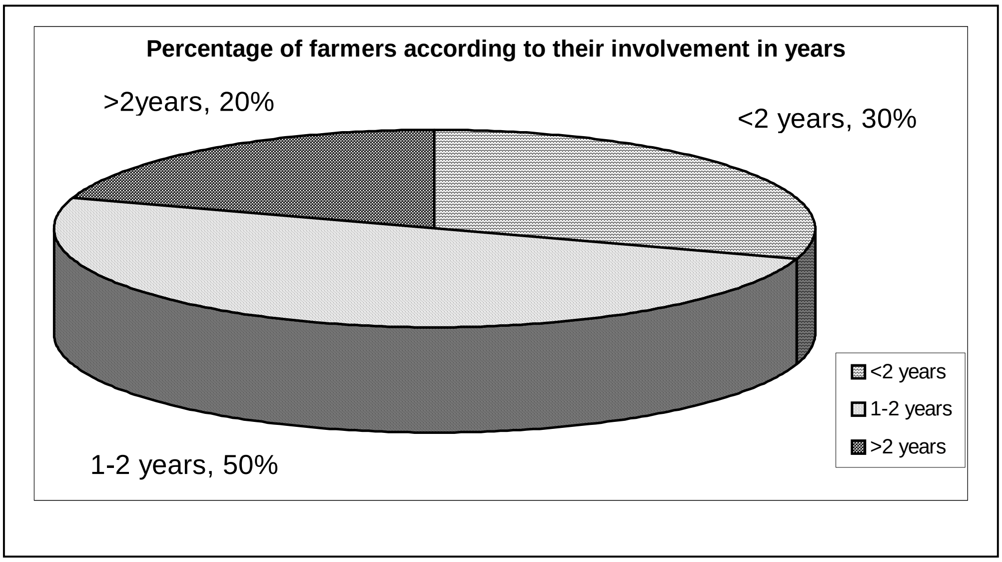
Willingness of producers to produce organic products

The pie graph shows that the percentages of farmers who are willing to produce organic produce. 60% farmers are very much willing to produce organic products, 30% farmers are much willing to produce organic products while 1% farmers are less willing to produce organic products.



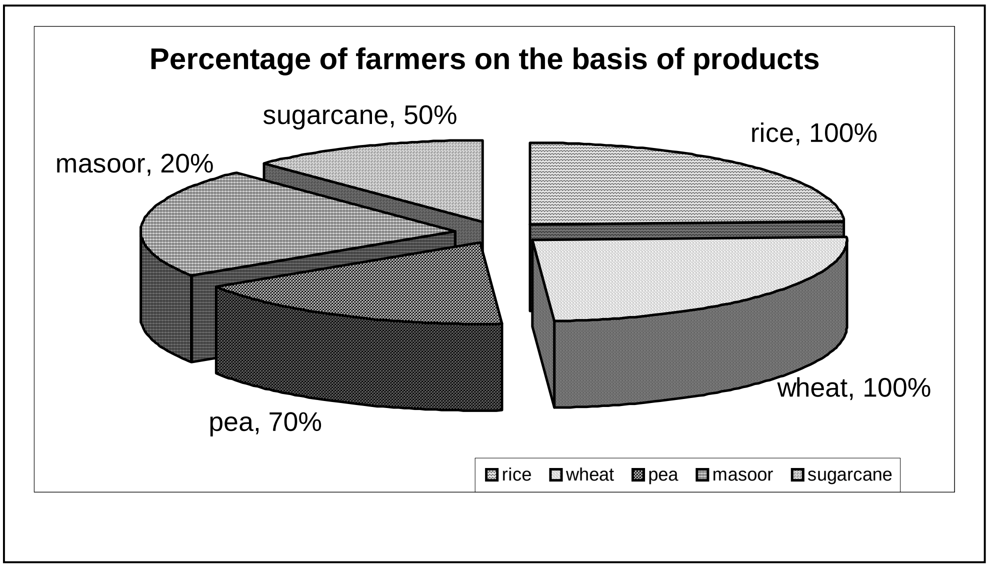
Involvement in organic farming

The pie graph shows that 30% farmers involve since less than 1 year, 50% farmers involve since 1-2 years and 20% farmers involve more than 20 years.



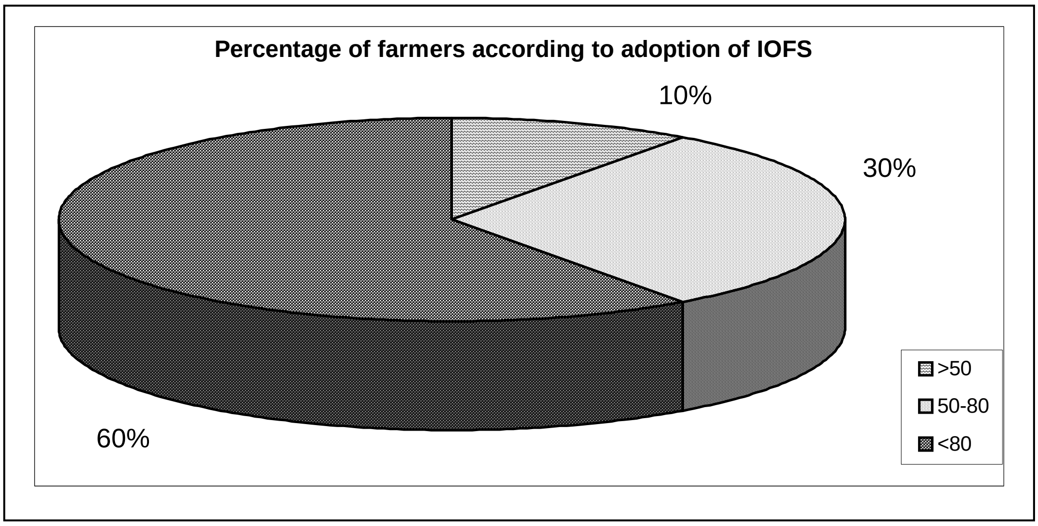
Type of product produced

The pie graph shows that 100% farmers grow rice and wheat, 70% farmers grow pea, 90% farmers grow lentil and only 50% farmers grow sugarcane.



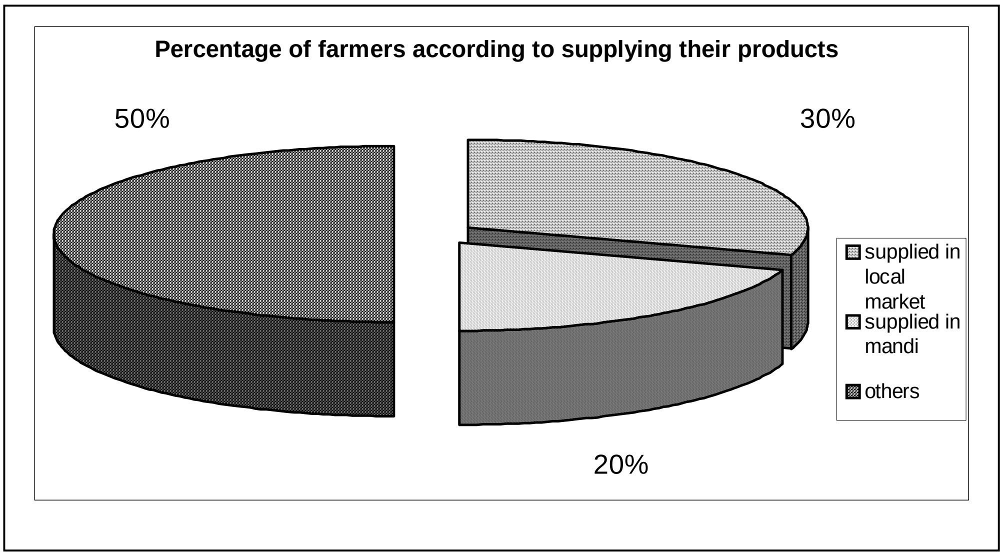
Extent of adoption of Indian Organic Food Standard

The pie has also shown that that only 10% farmer adopt less than 50% extent of Indian organic Food Standards, 30% farmers adopt 50-80% extent of Indian Organic Food Standards and 60% farmers adopt more than 80% extent of Indian Organic Food Standards.



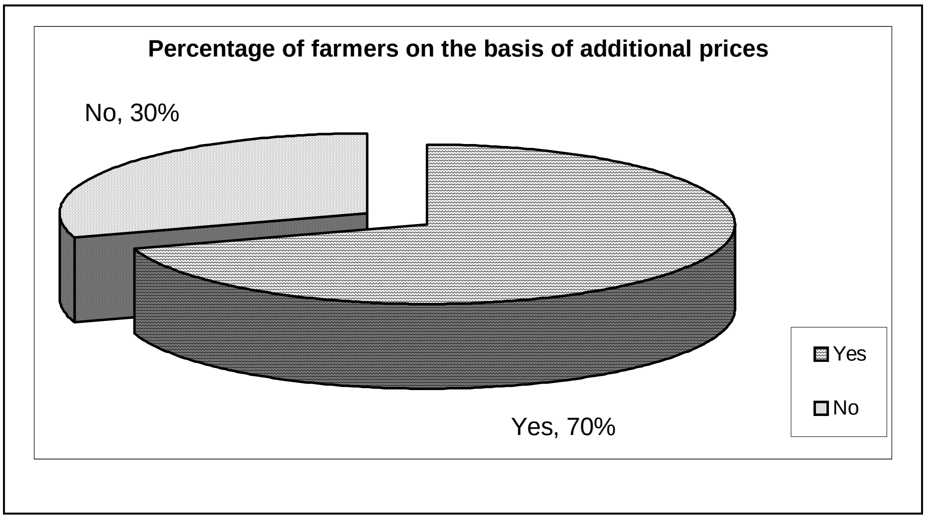
Marketing of products

The pie graph shows that 30% farmers supply their product in local market, 20% farmers supply their product in mandi and 50% farmers supply their product in other type of markets.



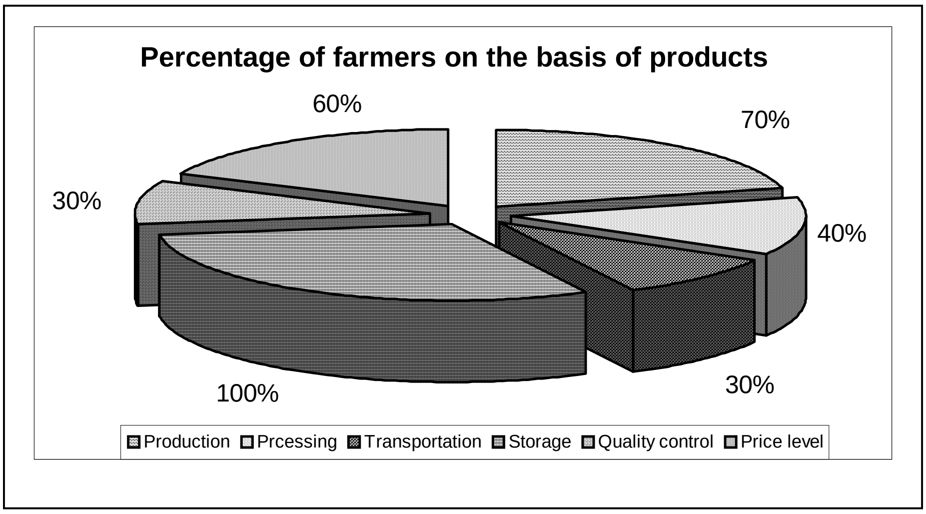
Additional price for the products

The pie graph shows that 70% farmers get additional prices for their organic products while 30% farmers do not get any additional prices for their organic products.



Problems in different activities to different farmers

The pie graph tells us that 70% farmers face problems in production, 40% farmers face problems in processing, 30% farmers face problems in transportation, all farmers face problems in storage, 30% farmers face problem in quality control and 60% farmers face problem in setting of price level of organic products.



The similar study is done by Singh, R. (2000) who reported that there were various constraints faced by the different types of farmers relating to marketing. Setting of efficient input supply system, low cost of inputs, improvement of marketing system, proper extension services, strengthening of diversification promotion activities conduct of awareness and training programme particularly for women by extension people. Are the important policy implication people are the important policy implication emerged from the study for making system more remunerative to the farmers in the study are specially the small farmers.

Preference Scale for organic farmers

The table 1 shows the preference level. Mostly farmers prefer to grow organic products due to personal and social factors. They prefer only those substances which are allowed in organic farming. They prefer to process to store organic and non-organic foods separately. They prefer organic foods due to its good nutritive value, test and flavor.

Awareness scale for organic farmers

The table 2 shows the awareness level of the farmers who grow and export organic products. All farmers are aware of the organic farming and organic products. Mostly farmers are fully aware that organic farming leads no health hazards. Mostly farmers are not fully aware about certification programmes and its process. They know that not only production but processing also should not affect the original products to any great extent. They are not fully aware about consumer awareness level of organic food products. Mostly farmers are fully aware of processing and storage organic products.

Table 1

Statements	Percentage	
	Yes	No
1	80	20
2	20	80
3	20	80
4	60	40
5	80	20
6	100	0
7	20	80
8	70	30
9	60	40
10	70	30
11	60	40
12	70	30
13	50	50
14	60	40
15	80	20
16	70	30
17	80	20
18	100	0
19	100	0
20	100	0

Table 2

Statements	Percentage		
	Fully aware	Partially aware	Not aware
1	100	0	0
2	100	0	0
3	30	60	10
4	70	30	0
5	50	40	10
6	50	40	10
7	80	20	0
8	70	30	0
9	50	40	10
10	50	30	20
11	40	40	20
12	30	40	30
13	20	40	40
14	20	40	40
15	20	30	50
16	0	20	80
17	0	30	70
18	20	20	60
19	30	40	30
20	40	20	20
21	20	20	60
22	40	40	20
23	40	20	40
24	30	30	40
25	50	30	20
26	10	10	80
27	80	10	10
28	90	0	10

Summary and Conclusion

The land utilization for organic farming is less than 5 acres in the case of 50% farmers while 50% farmers are doing conventional farming on 5-10 acres land area. It shows that comparatively land area utilized for organic farming is less than the conventional farming. Mostly farmers are very much willing to produce organic products. It is revealed in the study that 60% farmers are very much willing to produce organic products and 30% farmers are very much willing to produce organic products. Only 1% farmers are less willing to produce organic products. The study shows that 50% farmers are involved in organic farming since 1-2 years only. All the farmers grow rice and wheat as major crops and only 50% farmers grow sugarcane.

The extent of adoption of Indian Organic Food Standards is more than 80% by mostly farmers.

The 50% farmers supply their products in other markets not in local or in mandi. Mostly farmers get additional prices for their organic products. This is analysed by the study that 70% farmers get additional prices for their products.

The study reveals that producers use organic manure (trichoderma, pseudomonas etc.) in their field. They follow IMO Standards strictly and the quality of their products is controlled by IMO. They follow IMO standards in production and processing too. They use admitted practices for different activities, which are admitted by IMO.

The study also shows that the problems, faced by farmers for producing and marketing organic products. Mostly farmers face the problems related to production, storage, marketing and price level of products.

Another section of interview schedule shows the preferences of farmers regarding organic farming. Mostly farmers prefer organic products. The awareness scale shows that mostly farmers aware about organic farming, certification and organic standards. They are aware of the practices and substances, which are admitted and prohibited for organic farming, but not fully aware.

Low cost certification, improvement of marketing system, setting of efficient input supply system, strengthening the awareness level of people about organic farming and conducting training programme for farmers, are the important policy implications emerged from the study for making organic farming system more remunerative to the farmers and strengthening marketing system for organic products.

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Domestic % 20 market % 20 may % 20 have % 20 doubled % 20 %, 20 business %, 20 % 20. 22 – nov. 01. 10:00 am.

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Organic Bazaar - a local marketing initiative – Our experience in Thiruvananthapuram City, Kerala, India

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'Organic' was not a popular term in the state of Kerala or to be more precise in the capital district of Thiruvananthapuram. Kerala is one of the states where most amounts of pesticide residues on farm products, especially vegetables & fruits, were detected. Organic farming is being practiced in the state for many years, but the public was never demanding as far as toxic-free food was concerned. Besides the fact that associations of organic farmers are functioning in the state for many years, credible organic food is still not available in the market. Neither a niche market for organically produced food is there nor there is any system for ensuring the credibility of pesticide-free food.

In the beginning of the last century Kerala was predominantly an agricultural state with more than 90% of its population depending directly or indirectly on agriculture. From 1960's onwards, as a part of the 'green revolution-package', the State Government through the State Agricultural Department and Kerala Agricultural University, endorsed, advertised and advocated for chemical agriculture and using its wide extension network made it sure that the state becomes a chemical-input based agricultural region. Along with this, the government policy showed a clear shift from food crops to cash crops. From paddy to millets and homesteads to forests, everything gave way to rubber, coconut, spices, tea and coffee. The traditional sustainable life style was given away for industrial agriculture, which demanded more chemical inputs and which directly and indirectly destroyed the ecological, social and agricltural fabric of the state. Right from those days of green revolution, a small population of farmers, scattered throughout the state, were against such farming and they remained organic. In course of time many farmers converted from chemical farming, to organic practices, realising the bad effects of chemicals on soil, water, food and on social relationships. In the 1980s, an organic farming movement started, inspired by personalities like Masanobu Fukuoka and his legendary book '*ONE STRAW REVOLUTION*'. But this movement was confined to groups and individuals, scattered through out the state, and was not popular among the general farming community. Though they emphasized the need for 'Organic farming' and triggered the real organic movement in the state, they concentrated not on the marketing part. Organic food never found its much-deserved space in the market and is still sold along with the chemical-contaminated food.

In the recent past, but, the term 'organic' was given a push in to the lime light by many groups, NGOs and off late by the state government. But most of such efforts were either aiming an export market or a high profit-domestic market (with hiked prices) for organic produce. This obviously holds every chance for the ordinary public to keep away from organic products. In some shops the organic products were sold at more than double or thrice the price of ordinary product. The domestic market remains still a conventional-chemical-one. The policies and the standards set often cater to the needs and capabilities of large-scale farmers only. The situation is such that even if small-scale farmers, coming to 85 % of the farming population, want to go organic, they may find it impossible to meet the standards of organic farming as it is defined now and may never get an organic certification in compliance with the international standards. This is, in one sense, depriving them of their right to produce and market toxic-free food.

Existing marketing styles in Kerala.

Kerala State being highly literate (>90%) is surely becoming aware of and is in demand for chemical-free-food. But besides the increasing demands, organic food is not available in the market. Due to the governmental policy shift towards cash crops, destruction of wet-paddy-lands and due to the downfall in its agricultural situation, Kerala is predominantly a consumer state producing only 25% of the required food grains. Food comes from neighboring states and is devoid of any chance for setting organic standards. For agricultural products, there are many kinds of outlets in Kerala.

1. Traditional local markets or '*chanthas*', where the producers come directly to sell.

2. Women vendors who collect the produce from local producers or more often nowadays from wholesalers, and sell them by house-to-house delivery.

3. Street vendors.

4. Retailers who take produce partly from a wholesaler and partly from local producers.

5. Supermarkets.

6. Wholesalers.

The disappearance of '*chanthas*', which was the local 'coming–together for producers and consumers, and destruction of relationships even at local levels have pushed Keralite to depend on retailers and supermarkets. Local farmers often sell their produce to the wholesale markets, from where it reaches the retail outlets. The producers never meet the consumers, as it was possible in the traditional *chanthas* and chances of developing a relationship between them, based on mutual trust, could be easily ruled off. This was the major hindrance in the marketing of chemical free products as the consumer and the producer remain faceless for each other.

The idea of *ORGANIC BAZAAR* and its implementation

It was exactly at this point of time that the idea of "*Organic Bazaar*", which literally means 'Organic market, came up as a success story by the Institute for Integrated Rural Development (IIRD), Aurangabad, in the State of Maharashtra, The idea was to link genuine organic farmers to the consumers, avoiding the middlemen, reviving trade based on mutual trust between human beings, to create environmental awareness and to build relationships. We decided to implement the idea in our town. We were already working on organic farming, in Venganoor village near the city on three groups of people– small-scale farmers, landless marginal farmers and rural women, and were able to connect two of the women-groups to the market.

To give publicity to the idea, we selected a space in the heart of the city for conducting the bazaar. Then we made a selected list of consumers and informed them about the idea and the venture. We also gave small reports in local newspapers regarding the Bazaar.

About 150 people visited the first bazaar and around 100 registered as consumers of the Bazaar. Along with the Bazaar, we exhibited awareness materials regarding pesticides, fair trade, plastics, environment etc. A film show featuring many documentaries on similar issues was also conducted.

In the bazaar the perishable goods like fruits and vegetables were brought by 2 women's organic farming groups. Cereals, millets, pulses, tuber crops and processed foods came from farmers and credible organizations working for the spread of organic farming, within the state and outside, whom we knew personally. The consumers of the bazaar were clearly informed about the sources of food and the need of developing mutual trust in building the idea. Local organic farmers directly came to the bazaar to sell their products. Contact addresses and details of those farmers and groups were given, who couldn't directly come to the bazaar. The consumers were from different strata of the society and they endorsed the idea.

Inspired by the first Bazaar we decided to continue it once in every month. From the third bazaar, we shifted the venue to a residential area in the city. A school run by the residence association was given to organise the market, on off days. The market there after is conducted regularly every month at this school for the last 6 months. All the consumers are being informed about the date and timing of the bazaar via post cards and telephone. Presently the number of producers who come to the market has grown to around 25. Another women's group and other interested small farmers have joined the market. The demand for organic produce has grown much and considering the nature of producers i.e., their small land holdings, catering to such huge demands is a constraint, but we realize that there is absolutely no need to rush. We are trying to increase our farmer base. We are regularly meeting farmers and farmer-groups and trying to spread the idea of organic farming and the local marketing initiative of 'Organic Bazaar'. Many consumers who got inspired by the experience of the small farmers also have shown interest to join the market as a producer .

Market, awareness and certifications

In our part of the world, the producers need to be convinced more, rather than the consumers. Farmers are mostly small-scale growers and they need to be converted in to organic growers. Consumers are more aware of 'safe-food', but are not completely aware of the intricacies of farming systems. As avoiding chemical inputs alone doesn't make a product organic, from polluting agents like plastics up to other leachates in to the farm (including industrial waste and house hold drainage) were considered while setting standards for producers to organic bazaar. We organised a producer's meeting, discussed with them the standards to be met and decided on it. Changes were made according to the existing ground realities. As for small scale farmers, air-drift and run off contamination by pesticides & fertilizers from near by farms are inevitable realities, such things are temporarily kept out of the standards. Organic manure like farmyard manure & oilcake are also allowed to be purchased from trust worthy dealers or farms. But no packaged inputs (even those labeled, 'eco friendly') are allowed. Traditional methods of crop protection and farming, mixed cropping, traditional crops and varieties and soil and water conservation are given importance. Since permanent conversion of ecologically sensitive paddy wet lands and lakes into farmlands are a growing concern in our state, such converted farms are kept out of the bazaar.

The market is arranged in 4 selections

1. Awareness materials & exhibition

2. Perishable goods

3. Cereals, millets, pulses & processed goods

4. Biodegradable utility materials & toys intended to reduce & avoid plastic use & a small section to improve the diminishing status of the local handloom tradition.

Awareness materials and publications are exhibited concerning pesticide use, tragedies like Bhopal & the pesticide-tragedy in 15 villages in northern Kerala (due to the aerial spraying of endosulfan on cashew plantations), organic farming, POP – elimination, industrial toxins, traditional cropping systems, soil & water conservation etc. Post cards, calendars and posters are kept for sale.

Traditional farming, Plastics and packaging: -

In Organic Bazaar, we give emphasis to two important things other than eliminating toxic inputs.

1. Reviving traditional farming systems: traditional seeds, traditional fruit species, and fruit varieties especially that of jack and mango and pine apple, traditional methods of crop protection, reviving food grains including rice.

2. Avoiding plastics from all farming practices: From covering the fruits, solarisation, littering, burning plastic, and to packaging, plastic is avoided. Traditional styles of packaging with banana leaves, arecanut leaf-sheath, other leaves and also with cloth is given importance. In the bazaar consumers bring their own carry bags. Plastic carry bags are avoided and we have designed special cloth-carry-bags for the bazaar.

The idea & its spread: -

The concept of organic bazaar has spread considerably among the city dwellers in the span of 8 months. Many people, both consumers and producers have started contacting us to be a member of the effort and the demand for organic food has grown considerably.

One of the major ideas behind the bazaar is to build relationship between the consumers and producers. In our organic bazaar we have regular consumers, who have built a rapport with our producers and are interactive. We also organised a consumer producer meeting and evaluated the bazaar. We believe that need of certification by an external agency is required only in situations of distrust and confusion. In our bazaar, the idea of farmer or community certification of products and farms is being discussed. We are forming a local organising committee including individuals, groups, producers consumers and decide on the methods of improving the market, redefining standards if necessary , devising a permanent classification of products, labeling and certification. As the market is based on the mutual trust of people, the labeling and certification needs to be simple and transparent. Currently our team is inspecting the farms and making sure that the products are made according to the standards. We look forward to the idea that this inspection and certification should be done mutually by the farmers itself and a procedure needs to evolve regarding this.

At present, Thanal is organising the bazaar from booking the spot to awareness building and transporting of products. The prices are decided after comparing the market prices of the products and then discussing with the producers to fix the margins. The producers are currently given the freedom to obtain the prefixed price to their products without deducting any organizing charges. Comparing the existing system in the locality, where the farmer gets less than half the share of the market price obtained by the retailers, this move was welcomed by the producers. After many bazaars, but, we are finding it difficult to continue this style as the organizing charges are mounting. So we intend to talk to the consumers and producers and the LOC to evolve a new method, so that organising charges are shared between them. We hope that over the months a system would be evolved such that the LOC succeeds in organizing the markets and the bazaar become an independent and spontaneous arena for building relationships, trading safe food and sharing information.

ORGANIC BAZAAR
A NEW CONCEPT IN CONSUMER – PRODUCER COOPERATION

Dr. Chandan Mukherjee, President
Society for Equitable Voluntary Actions

Marketing of organic produce remains a hindrance for its spread and propagation. The ifficulties are from both the sides, i.e., producers as well as consumers.
The supply side problems are:

1. The producers are scattered, so that accumulation of marketable surplus needs extra effort.
2. Most of the producers have very small holdings. Therefore, the output is limited. The viable marketable surplus quantity has to be organized by special efforts.
3. All the producers tend to produce similar items, so that variety is lacking.
4. Many of the producers are organic by default and lack the basic marketing skills.
5. The middleman is not interested in treating organic produce in any different manner, While the organic procures at least expect a different treatment, if not a higher price.

Demand side problems as experienced by the consumers are:

1. The consumers are totally unaware of the existence and location of organic producers.
2. The consumers want to fulfil all their requirements from a single-point supply source.
3. Like-minded consumers are also strewn.

The fundamental thrust in any effort in marketing of organic produce has been directed towards export market.
India has emerged as a leading producer of organic produce. This has been made possible because of the country's intrinsic and inherent strength in agricultural activities. While a sizeable portion of the farming community practises traditional systems, the plantation industry like tea, coffee, spices has opted for the rule-based methods as propagated by organic agriculture (OA) experts. The Government of India (GoI), has finally woken up to the need of the hour. They have adopted National Programme for Organic Production (NPOP). NPOP has initiated accreditation and certification procedures. A national steering committee has also been established to overview and coordinate all the related activities. A very appropriate logo "India Organic" has also been designed and been popularized.
The various state governments have also jumped into the bandwagon and there is a race amongst them as to who will be the first or better in this move. The newly formed state of Uttaranchal has declared itself to be fully organic and they have established organic produce, commodities board. Madhya Pradesh has earmarked 3,300 villages where only OA practices will be followed. A government estimate declares that an area of 2,50,000 hectares of land is already under organized

OA production. The Khadi and Village Industries Commission (KVIC) has decided to open 15,000 retail outlets for marketing and distribution of OA products. Some such outlets are already in operation in the metropolitan city of New Delhi.

All the above efforts are directed towards the urban population or/and export market. Our endeavor is aimed at providing the availability to the rural or small town population. We believe that organic food is good for the health of the people and it should be promoted not only for commercial gains. We also believe that the producer has or should have the first right for consumption of the good material that he is producing. Our philosophy and conception received funding and knowledge support from the Institute for Integrated Rural Development (IIRD), Aurangabad.

Society for Equitable Voluntary Actions (SEVA) is engaged in rural development activities in the district 24 Parganas (North) in the state of West Bengal – a state on the Eastern side of India and sharing border with our neighbor, Bangladesh. The activity of SEVA spreads in about 35 villages in 3 blocks. SEVA has been propagating the concept of OA for the last 15 years and we are one of the old and active members of IFOAM. SEVA in the past had participated in a global comparative study between traditional, chemical and organic agriculture. We had always felt the need for offering marketing and distribution openings to the organic farmer and also wanted to make them involved in the marketing activities. The state of West Bengal has a very limited land area available for farming. The pressure on land is extremely high, resulting in a huge number of small and marginal farmers, most of whom could hardly afford the high cost of chemical agriculture. The task before us was to baptize them into the concept of low input agricultural practised with a simultaneous assurance that we shall provide the necessary support for marketing their production. OA being a highly rule-based system, the willing farmers were first trained to get into the habit of documentation. The land area available was so small that individual farmers could hardly afford to have their own Compost Pit. So the concept of Community Compost Pit was popularized. The availability of certified organic seeds being extremely limited, the farmers were encouraged to use native seeds from their own stock. The organization provided small amounts as interest-free loans to the needy. Close link was established with Bidhan Chandra Krishi Viswavidyalaya (BCKV) – the leading agricultural university in the state of West Bengal.

The demand side of the situation that is identification of the consumers was done as a parallel exercise. The local market committee was approached to let out the space required for operating the market activities. There was apprehension, anxiety and resistance from many. All this could be overcome through dialogue and discussion. The consumers were located and selected from amongst the local school and college teachers, people working in the various government offices, etc. The most striking observation that we noted was that most of the people were at least vaguely aware of the positive aspects of OA products. This has obviously helped our efforts tremendously. We have shortlisted 71 farmers from 9 villages. These 71 farmers are serviced by 6 Eco-volunteers on a day-to-day basis. Each of these Eco-volunteer is a creator of one Eco-club. The farmers attached to each Eco-club meet at least once a month to interact amongst themselves and SEVA’s workers. 93 numbers of consumers have been shortlisted by these Eco-volunteers and they are regular buyers of organic produce. The Organic Bazaar is organized every Mondays and Fridays between 4 – 5:30 p.m. in summer and 3:30 – 5:30 p.m. in winter. All these timings and location has been finalized after a thorough discussion with the producer and the consumer.

The consumers have also put in their suggestions to decide on the production programme for the coming kharif season.
After having met some success wit the rural/small town consumers, we were invited to extend the facility to the city-breds also. Currently, 4 such market spots have been identified – 2 in the north and 2 in the south in the great of megapolis of Calcutta. Thorough discussion with the intending consumers is a prerequisite for starting a market spot. The leading organic farmers accompany SEVA workers along with their produce on every Saturdays. The spot is tastefully decorated to create an ambience of comfort, trust and pleasure. Creation of shopping malls is a phenomenon practised by big retail business houses to infuse the feeling of comfort and pleasure while shopping. The whole idea there is to divert the consumer's mind from the price aspect of the bargain and elevate the function of buying to the level of status symbol. We do not want to emulate the examples of the philosophy of shopping malls. But at the same time, we want to inject a feeling of déjà vu between the producer and the buyer. The classical economic theory says that the fundamental relation between the buyer and the seller is a contradictory one. But according to our philosophy, we want to replace this "contradiction" by cooperation. We believe that the relation between the consumer and the producer is of mutual dependence, i.e., one cannot live without the other. It would, therefore, be ideal if one party understands the other's needs and aspirations. Mutual trust has to be the binding factor. We are proud to say that it has worked very well.

The advantages of the system practised by us can be listed as below:

1. Absence of any middleman enables the price to be reasonable as compared to a normal market.
2. The farmers sell their wares in retail units to the individual consumers so that they are able to obtain a better per unit realization.
3. The small farmer is able to participate with his limited production abilities.
4. The produce, particularly, the vegetables, are plucked on the day of transaction, so that they are as fresh as they could be.
5. The consumer is able to express his views very clearly to the producer so that the latter could take corrective steps very fast.
6. Since the producer is able to monitor and estimate his demand potential, there is hardly any chance of any stockpile.
7. The pricing is arrived at through a process of mutual negotiation.
8. The price of the produce can be kept out of the normal market fluctuations, since hoarding and profiteering is not the driving force for the producer.

Needless to say, it has not been so much of a smooth sailing as it appears on a piece of paper. The basic difficulty or shortcoming is miniscule quantity of produce and varied nature of the consumer. We have just made a beginning based on the faith and believe that the journey of a thousand miles starts with a small step from your house. Our efforts can really bear the fruit if a thousand flowers can bloom.

9. are as fresh as they could be.

10. The consumer is able to express his views very clearly to the producer so that the latter could take corrective steps very fast.
11. Since the producer is able to monitor and estimate his demand potential, there is hardly any chance of any stockpile.
12. The pricing is arrived at through a process of mutual negotiation.
13. The price of the produce can be kept out of the normal market fluctuations, since hoarding and profiteering is not the driving force for the producer.

ORGANIC FARMING OF MEDICINAL PLANTS AND ALTERNATIVE MARKETING

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Organic farming and cultivation of medicinal plants mutually benefit each other. In organic farming, growing medicinal plants around the field and in between the rows help to protect the crop from pest attack. Medicinal plants are not good to use as medicinal unless they are organically produced.

Medicinal plant diversity:

Traditional knowledge of farmers in India has been growing of medicinal plants in and around the field. In the organic field, medicinal plant component is a very important one. While all other plants have been domesticated and cultivated, medicinal plants mainly remain in the domain of wild.

A diversity of this plant in organic farm is a must. They should be grown rather than cultivated. They must be given the status of wild rather than cultivated and domesticated. Medicinal plants should not be cultivated in a mono crop pattern. Hence they must find place in the fences (Live hedge), bunds, water channels where they will take care of themselves. Species that can be grown in the fences are: Vitex negundo, Lawsonia inermis, Adathoda vasica etc. Species that can be grown on the bunds: Murraya koengii, Aloe vera, Hibiscus rosa sinensis.Species that can be grown in the water channels Centella asiatica, Bacopa munnieri. List of plants that can be grown in an OA farm is given below.
Here below is given the uses of certain important medicinal plants.

S.No	Botanical Names	Parts used – Uses
FRLHT		
1	Azadiracta indica	Leaves – Wormicide, jaundice, ulcers in mouth. Bark – Fever, headache. Seeds – Pesticide, tooth ache.
2	Justicia adathoda	Leaves – Cold & Cough , menstrual problems. Root – Cold & Cough, poisonous bites
3	Embelia ribes	Seeds – indigestion, abdominal pain Fruits – wormicide
4	Hibiscus rosa sinensis	Flowers – fever, anaemia Leaves – hair washer, dandruff - remover.
5	Holarrohena pubescens	Seeds – cold, fever, abdominal pain, burning stomach Bark – Diarrhoea
6	Lawsonia inermis	Leaves – fungicide, hair growth, burning feet & fissures in between toes.
7	Leptadenia reticulata	Tubers – to increase breast – milk secretion.
8	Punica granatum	Flowers Fruit cover - Wormicide , diarrhoea, dysentery Fruit juice - eye problems, digestion, diarrhoea controller
9	Withania somnifera	Roots – abscess suppresser, Increases immunity. Whole plant – relieves head ache
10	Aloe barbadensis	Leaf galley – relieves headache, burning of eyes. Heals cut injures, burns. Relieves abdominal pain during menstruation
11	Asparagus racemosus	Tubers – increases immunity and breast milk secretion. Relieves burning feet and acidosis
12	Bacopa munnieri	Stem & leaves – increases memory power & cools the body
13	Centella asiatica	Stem & leaves – increases memory power & cools the body, Relieves less

		urination
14	Hemidesmus indicus	Roots – cools body, relieves fever and burning urination
15	Ipomia mauritiana	Tubers – increases immunity & breast milk secretion
16	Piper longum	Fruits – cold & cough , indigestion, gas trouble
17	Tinospora cordifolia	Stem – Relieves fever , increases immunity
18	Coleus aromaticus	Stem & leaves – relieves cold & fever
19	Achyranthus aspera	Root – scorpion stinging , relieves tooth ach Whole plant – increases menstruation
20	Ocimum basilicum	Pimples, tonsillitis, cold, cough , fever

Need for cultivation of Medicinal Plants

China is the highest exporter of medicinal plants. The value of exported raw drugs, therapeutics and others is estimated to be around Rs.18, 000-22,000 crores.

India Exports to a certain extent and its share in the International Trade Centre is Rs.200 crores though scope for internal and external market is very high.

India uses the medicinal plants collected from the wild. Because of unsustained harvesting of medicinal plants daily few species become extinct.
At the present scenario there is more demand than before for medicinal plants from medicine, cosmetics, food industries.
Unless this need is met through "cultivation" the medicinal plant diversity will be lost soon.
This awareness has come among the scientist and environmentalists and Policy makers.

Serious steps are taken by the Ministry of Environment, Ministry of Health, and among universities.

The Government has set up a Special Board in the National level to assist the Institutions and individual farmers to cultivate medicinal Plants- National Medicinal Plant Board.

Department of Science and Technology is funding heavily for doing research in medicinal plants
Department of Bio-technology also is funding towards the research in Medicinal Plants

Availing these funds the research institutions and universities are conducting special courses

Recent five year integrated courses in medicinal plants are offered in universities
Post graduate courses are also open for the students. Most of the thesis in Botany and Horticulture are in the field of medicinal plants.

Government is encouraging entrepreneur to go for medicinal plant based industries.
Now Medicinal plant" cultivation" is necessitated from two angles.

i) Conserving Medicinal plant diversity.

ii) Lively hood option for the rural Poor.

Problems in Marketing the Medicinal Plants

Cultivation cost makes the cultivated medicinal plants costlier than the materials collected from the wild .

High fluctuations in the market

If the price goes down, the buyer inspite of the contract made tries to reduce the price or he does not appear in the scene.

Big gap between the price given to the farmers and the profit made by the merchants especially who is in the export market is very high. If the poor farmers were to be protected special systems should be worked out. What we suggest is the Alternative Marketing system.

Need for growing Medicinal Plants Organically

Sidha or any system based upon medicinal plants will work well only when the body is free from Poison
Before beginning the treatment, Vaidyas will cleanse the system from poison.
Only if the medicinal plants are free from the residual effect of the chemicals its action will be better.
Hence medicinal plants have to be cultivated in the organic fields only. So we can easily integrate the growing of Medicinal plants in the organic farming.

ALTERNATIVE MARKETING

Increased globalization eliminates the small and marginal farmers from marketing and they are badly affected by strict certification procedures. Alternative marketing aims to build a strong and close relationship between the farmers and the consumers. Through this marketing system the rights of the local people can be protected.
In rural areas people still use various medicinal plants for their primary health care. They need a constant encouragement to collect and grow the plant commercially and bring the surplus to the local market. For that we must educate the farmers in selecting a species that is suitable to their own environment and the cultivation practices that could be adopted to get better yield. Growers should select those species that will not affect even when there is a delay in harvesting and marketing.

Alternative Marketing System

. The Paradigm that is used for Marketing of Organic Product can also be used for the marketing of the medicinal plants and medicinal products. The growers or collectors of medicinal plants will have a cooperative of their own and sell to those customers who are in need of these herbs and medicines. The end users will see that the herbs collected are from clean place and also the farmers follow the organic principles in growing the medicinal plants. The herbs and the preparations made out of these herbs will be needed by the local community, Local community healers or local shops which can be easily accessed by the users. The surplus can be sold to external buyers and the foreign market.

Herein some enlightened institutions can play a major role to save the poor farmers from the exploitation by the corporate Sectors.

In short the groups sell to the members first and next to the other group members, to local shops and to the Traditional local health healers. Next through some intervention of enlightened institutions the farmers and women groups can reach out to external markets.

Through this Paradigm of Marketing, Medicinal Plants can become a relevant enterprise for the livelihood options of the rural Poor.

Even though Some medicinal plants are grown and few others are collected through Sustainable harvest the farmers need to maintain as much biodiversity as possible in their field so that they can harvest whenever some demand is there or the diversity itself will benefit the farming system in many ways.

Local Standards for assessment of Organic Growing of Medicinal Plants

A local committee comprises of few experienced farmers, interested consumers and a few chief functionaries of NGOs were formed. Periodical visit of local committee aims at,

3. Motivation of farmers for changing themselves to completely organic
4. Certification of farms as ‘Organic’ using the following standards
    - Use of traditional seeds
    - Habit of composting Farm yard manure and agricultural waste.
    - Presence of biodiversity in the farms
    - Maintenance of cattle
    - Preparation of Panchakavya regularly for repeated use
    - Regular use of Herbal preparations before pest attack

The following medicinal plants are used widely by people for preventive and promotive health, by vaidyas in their local health traditions, and by industrialists for production of medicines on the commercial scale.

1. *Adathoda vasica* Family: Acanthaceae

It is a shrub grown around the fields. It has elongated and pointed leaves. It produces white flowers in spikes in the upper axils. The leaves are bitter in taste. Its smell can protect the crop from pest attack.

Domestic uses:
The leaves with few other medicinal plants like Tulsi and Solanum trilobatum are used to prepare a decoction. This decoction is a remedy for cold, cough, respiratory infections of both lower and upper tracts and tuberculosis.
Commercial uses:
It is used in cough syrup, soornas for the above mentioned diseases. Big medicinal companies require it in large quantities, even when not taken by the companies it can be used as green leaf manure.
Climatic requirement:
It requires loamy soil.
Propagation: It can be propagated through seeds and vegetatively through cuttings. Semi hard wood and soft wood cuttings, 8 to 10 cm long with 3 to 4 internodes are planted in polythene bags or raised beds in April- June. The rooted seedlings can be transplanted in the appropriate time during the early rain.

2. *Aloe barbadensis* Family: Liliaceae

Perennial herbs having short stem, shallow root system. Bears large thick succulent pale green convex leaves tapers to a blunt tip with horny prickles on the margin. Bright yellow colour small tubular flowers borne on simple or branched scape from the rosette.It is grown around the coconut trees and in the rows among the crops.

Domestic uses:
In rural areas it is traditional to eat the bitter gel with jaggery during the 5th, 7th and 9th month of pregnancy.
Women who suffer from white discharge use the same for 7 days continuously early in the morning.
For dandruff the gel is applied over scalp for 1-2 hours and then washed.
External application of the gel is done over burns.
Commercial uses:
The gel of *A. barbedansis* is the base material for cosmetics, soaps, face creams, hair oil etc.
Climatic requirement:
Well drained sandy soil is suitable for its growth. Grow well in dry regions. Water logging should be avoided. Faster growth is observed in fertile heavier soil- black cotton soil of Central India.
Propagation:
It can be propagated through suckers with 4 to 6 leaves. Each plant will weigh 2-5 kg and each kg cost about Rs.5. Under irrigated condition the net return will be Rs.1,50 000/acre.

3. *Azadirachta indica* Family: Meliaceae

A medium to large sized tree, identified by its imparipinnate shining deeply serrate leaves. Flowers cream or yellowish white in axillary panicles.Fruits greenish yellow when ripe.
It commonly occurs in all areas. It is planted as avenue trees in front of the home and farms.

<u>Domestic uses:</u>
The tender leaves are ground to a paste and eaten to kill abdominal worms in human and animals.
External application of leafy paste is helpful to cure skin ulcers, scabies etc.
The bark of more than 25 years old tree is used for making decoction to cure fever and viral infections.
The seeds yield oil used for treating skin infections, intestinal and ring worms, chronic malarial fever and leprosy.
The crushed seeds and the cake obtained after oil extraction is used as manure to the crop.
<u>Commercial uses:</u>
Neem oil is used commercially in making bio pesticides and in soap industry. Even a poor man can afford to use the timber from neem tree in building his house.
<u>Climatic requirement:</u>
It grows on a variety of soils from sandy to clayey. Good drainage is necessary. It posses some amount of drought tolerance. It grows only under warm conditions.
<u>Propagation:</u>
It can be propagated using seeds.

4. *Agele marmelos* Family: Rutaceae

It is a small to moderate sized tree. Bark dark grey slightly corky. Flowers greenish white, sweet scented. Fruits globose,grey or yellowish, shell woody. It is seen in the wild in sacred groves.

<u>Domestic uses:</u>
The leaves are ground to a paste and used as remedy for ulcers in the stomach
Juice taken in the early morning is a good tonic for nerves. It can be domestically prepared.
<u>Commercial uses:</u>
The fruit juice is a commercial cold drink – serves as a tonic.
Dust prepared from dried slices of fruits of Bael and packed into normal tea bags.
In Tailand, about 100 km from Bangkok in a small village called Tha Tum, this cottage industry is supported. Each household is able to earn Baht 6000 (about$240) per month.
<u>Climatic requirement:</u>
Generally it is found in the temple compound. People don't cultivate in the land. It grows in areas with mean annual rainfall ranging from 500 to 2000 mm. It is drought hardy, often found in dry localities.
<u>Propagation:</u>
This can be propagated through seeds and vegetatively by grafting.
In North India a sweet garden variety is common. This is more suited for juice pupose

5. *Cassia senna* Family: Fabaceae

It is a small herb with compound leaves and bean shaped curved pods. Flowers yellow many in axillary racemes. Seeds dark brown, obovate and nearly smooth.

Domestic uses:
The leaves have the medicinal value of laxative. But it has a wide range of Commercial uses.

Commercial uses:
They are used in Pharmaceutical companies to prepare laxative tablets.
It is used for natural dyeing purposes.
Climatic requirement:
It grows well on sandy loam and lateritic soils of low and moderate fertility. It is very sensitive to water logging condition. It prefers warm and dry weather during the growing season. Generally farmers have only the monoculture practice but we can encourage integration of minor millets within this field.
Propagation:
It can be propagated through seeds. Seeds are soaked in cold water for 8 hrs and then shade dried. Since the seeds have a hard seed coat, certain amount of abrading of surface is necessary to induce quick germination.

6. *Coleus forskohlii* Family: Labiatae

It is a small herb which develops a branch of tubers in their roots. These are of great medicinal value.

Domestic use: Not so much for primary health care systems.
It cultivated mainly as monoculture only. We can integrate short duration pulses as a nitrogen fixing devise.
Commercial Uses:
It is used as a drug for blood cancer. Of late we hear that is being used for weight reduction. Many companies are interested in bulk quantities. It fetches fairly a good income for the farmers.
Climatic requirement:
Now coleus is cultivated in lands where water is available moderately. It can give a good yield of Rs.30, 000/ acre. Good drainage is necessary. Minimum irrigation is sufficient if cultivated in the beginning of south west monsoon.
Propagation:
It can propagate through cuttings. There is a demand for tubers. The tuber may be cut into pieces, dried and marketed.

7. *Hibiscus rosasinensis* Family:Malvaceae

It is a tall shrub, each plant bearing hundreds of flowers daily. They are of many colours. A lot of ornamentals have been developed which are of commercial value. The single row petalled red and white flowers are of high medicinal value. The flowers are rich in iron content.

Commercial uses:
Hibiscus flowers are used in herbal iron tonics and hair tonics.

Flowers can be eaten fresh. Fresh flowers from the garden can be used for decoction extraction.
Decoction made of flower dust also is good for health.
High demand for dry flowers .Cost may be Rs.120/ kg

Propagation:

It can be propagated through cuttings. Seedlings raised in mother beds increase the germination percentage. Better to plant this on the bunds of the water channel.

8. *Lawsonia inermis* Family: Lythraceae

It is a huge shrub may grow into small trees. The leaves are of medicinal value.

Domestic uses:

The ground paste of leaves is used to cool the body by applying over the palms and heals as a remedy for skin infections.
It can be used as a natural dye.

Commercial uses:

Mehandi powder is of great commercial value. It can be marketed in the form of dry leaves or in the form of powders.

Propagation:

It can be propagated through cuttings and seeds. It can be raised as a fence crop or in the bigger bunds. Community based growing is ideal. It can provide shelter for birds that control insects.

9. *Gymnema sylvestre* Family: Asclepiadaceae

A large woody profusely branched climber with pubescent young stem and branches. Latex milky. Flowers small,yellow, in axillary umbellate cymes. Fruits slender, Seeds brown glabrous, obovate with a thin broad marginal wing.

Domestic uses:

Leaves are reported to be useful for treating diabetes. Powder can be made from the dry leaves used at home for diabetes.

Commercial Uses.

Companies buy from medicinal plant gatherers in large quantities. Still cultivation has not become a practice. We can grow this along the fences where there is the supporting shrubs.

Climatic requirement:

It is seen wild in forestsCommercial cultivation of this crop is increasing because of its unique medicinal value. It requires shade for good growth. It thrives better on humus rich loamy soils.

Propagation:

It can be propagated both by seeds as well as vegetative means. I can be allowed to climb over the trees and shrubs on the fences.

10. Phyllanthus niruri Family:Euphorbiaceae

Slender herbs. Leaves distichous, oblong elliptic. Flowers solitary, axillary. Male flowers with minute disc glands. Capsule globose, smooth.

Domestic use:

Leaves are good remedy for stomach troubles like diarrhea, dysentery and dyspepsia. Fresh roots given in jaundice. Ground leaves are used to cure skin diseases and sores. Large quantities are needed commercially.
Agroclimatic condition. : In tropical zone they perform well during the monsoon times.
Propagation:
It can be propagated through seeds.
11. *Ocimum sanctum* Family: Lamiaceae

It is a small plant and smells good. It is being considered as a sacred plant by Hindus.

Domestic uses:
Decoction made of Tulsi leaves is taken as remedy cold, cough and fever. In Child health care it plays a major role. Because of its importance only it was grown in the court yard of the traditional homes.
Commercial use:
Tulsi leaves are used in Herbal medicines especially in cough syrup for fever, cold and cough.
It has very poor germination still it can be raised in the field through seeds.

12. *Withania somnifera* Family: Solanaceae

It is a sub shrub. Leaves elliptic-ovate, pubescent. Yellow axillary flowers.

Domestic uses:
Tuberous roots are effective in treating leucoderma, constipation, insomnia etc. leaves are recommended for fever, painful swellings and opthalmitis. A paste of the roots and bruised leaves are applied to ulcers and painful swellings. Its rejuvenating nature is well known in the circle of vaidyas.
Climatic requirement:
This species grows in tropical and subtropical climates and prefers dry weather for successful growth. Sandy loam or light red silts with good drainage is conducive for its growth.
Propagation:
It can be propagated using seeds. Direct sowing is recommended

13. *Bacopa monnieri* Family: Scrophulariaceae

Succulent herb, stem creeping and branches ascending. Leaves sessile, rounded at apex. Flowers pale pink. One of the five petals is larger than others. Seeds oblong.

Domestic uses: /Commercial
It is useful in treating inflammations, tumors, ulcers, constipation, asthma, skin diseases, leprosy, fever and general debility. Commercially large quantities are required
Climatic requirement:
It prefers marshy open fields and is suitable to humid climates. The plant can tolerate salinity to some extent.
Propagation:
It can be propagated by vegetative means through cuttings.

14. Embelia ribes Family: Myrsinaceae

A woody climbing shrub. Branchlets drooping consisting of white lenticels. Leaves alternate, base rounded with glands pitted on either side of the midrib beneath the base. Flowers bisexual, white, axillary and terminal. Drupes globose with vertical lines, greenish yellow turns black upon ripening.

Domestic uses:
Roots, fruits and leaves are used. Root infusion given for coughs and diarrhea. Decoction of dried fruits is used for fevers and diseases of chest and skin. Dried fruits is anthelmintic, astringent tonic used in scorpion sting and snake bite. Leaves are useful to cure skin diseases and leprosy.
Climatic requirement:
It can be cultivated in all types of soil especially the well drained light cotton soils, sandy loam and sandy soils. It can be propagated both by seeds as well as vegetative means.

15. Leptadenia reticulate Family: Asclepiadaceae

Climbing shrub with pale leaves. Latex is watery. Bark rough, thick and yellowish brown in colour. Flowers yellow, borne in umbellate cymes. Fruits are thick woody follicles.

Domestic uses:
Leaves and roots are reported to be used in treating skin infections.
Climatic requirement:
This plant grows well under shade.
Propagation:
It can be propagated through seeds and vegetatively through cuttings.

16. Asparagus recemosus Family: Liliaceae

It is a perennial armed climber with scaly leaves and tuberous roots. Stem terete, green, armed with spines. Flowers white in fascicles of racemes. Fruits sub globose.

Domestic uses:/ Commercial
The tuberous roots are reported to be used in nervous disorders, tumours, dysentery, diarrohea, inflammations, leprosy, throat infection, tuberculosis and cough.
Climatic requirement:
This sun loving species requires hot humid climate and rich, light, well drained soil. Sandy loam soil with good drainage facility is ideal .It is mainly collected from the wild.
Propagation:
It can be propagated by seeds and vegetatively through tillers. The tillers arising from the base of the mature plant can be separated and planted individually.

17. Centella asiatica Family: Apiaceae

A slender herbaceous, creeping perennial with rooted nodes and long internodes. From each node of the stem, leaves, roots and flowers emerge. Leaves are simple with elongated petioles and sheathing leaf bases, round in shape. Flowers pink and almost sessile.

Domestic uses:/ Commercial usage
This plant is considered useful in the treatment of leprosy. The plant is also reportedly used in treating insomnia, asthma, abdominal disorders and fever.
Climatic requirement:
Cold and humid climate is more suitable. Sandy loam and light black cotton soils are especially suitable for this crop.
Propagation:
It can be propagated by seeds and through cuttings.

18. Hemidesmus indicus Family: Asclepiadaceae

A perennial, slender, twining or prostrate shrub. Root stock is woody with numerous slender, terete stems having thickened nodes. Leaves are simple, variegated with white above, silvery white and pubescent beneath. Flower greenish purple.

Domestic uses:
The roots are reported to be useful in burning sensation, leucoderma, leprosy, skin diseases, asthma, dysentery and fever. Leaves are reported to be useful in vomiting, wounds and leucoderma. The stems are laxative and useful in inflammations, leucoderma, cough and asthma. The latex is good for conjunctivitis. The leaves are chewed for their refreshing effect.
Climatic requirement:
Garden loam soil along with addition of compost or humus is suitable for the plant to grow.
Propagation:
It can be propagated by seeds and vegetatively through stem and root cuttings.

19. Piper longum Family: Piperaceae

It is a perennial creeping shrub with swollen nodes. Leaves alternate with acute tip. Male spikes greenish yellow, fleshy, cylindrical with minute flowers. Female spikes erect yellow. Berries red or black when ripe and globose.

Domestic uses:
Fruits and roots are reported to be useful. Decoction of immature fruits and roots are reported to be used in chronic bronchitis, cough, cold and also as an antidote snake bite and scorpion- sting.
Climatic requirement:
This plant is typical to tropical humid climate and prefers shady moist conditions. Areas with good rainfall and high relative humidity are used for its successful growth.
Propagation:
It can be vegetatively propagated through cuttings and tillers.

20. Tinospora cardifolia Family: Menispermaceae

It is a climbing glabrous shrub. Petiole base twisted. Leaves glabrous, acuminate at the apex. Flowers light yellow, petels fleshy, loosely clasping the stamens in male. Drupes reddish, globose, sessile, turning red upon ripe.

Domestic uses:
The stem is reported to be useful in case of burning sensation, chronic fevers, inflammations, vomiting, skin diseases, cough, asthma and jaundice.
Commercial uses:
Well mature stems are in demand by companies. When allowed to climb on neem tree is said to acquire special medicinal property. It is mainly known for its rejuvenative nature. On account of this property it is called Amruthavalli.
Propagation:
Propagated by seeds and through semi-hard wood cuttings with 2 to 3 nodes.

21. Achyranthes aspera Family: Amaranthaceae

Erect herb covered with fine hairs. Leaves elliptic oblong, sparsely hairy above and densely hairy beneath. Flowers brownish and membranous. Seeds smooth and black.

Domestic uses:
The leaf is reported to be used for treating blisters in the mouth and also for cholera. Root is reported to be used to treat scorpion stings. The use of the root for cleaning the teeth strengthen the teeth.The whole plant is said to be used against whooping cough.
Commercial uses. This need not be grown by us. This grows in the field during rainy season when it can be collected in large quantities.
Climatic requirement:
Prefers rich sandy, slightly acidic soil and partial shade.
Propagation:
It can be propagated through seeds.

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Integrated Dryland Weed Control in Nature Farming Systems

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Abstract : As practices of integrated weed control in nature farming systems, surface application of a bioactive organic fertilizer, pigtailed rye (Secale cereale) straw mulch, and intercropped peanut (Arachis hypogaea) as a smother crop, were tested with soybean (Glycine max), pumpkin (Cucurbita moschata), and tomato (Lycopersicon esculentum), respectively. The bioactive organic fertilizer aerobically re-fermented when applied into the surface soil layer. Weed population decreased more than 50% by the soil surface fermentation. In the second experiment, residues of winter rye were brailed on soil surface in pigtail style, depressed weeds significantly and increased pumpkin fruit yield. In the third experiment, peanut intercropped into tomato crop smothered weeds and increased tomato fruit yield more 10% in addition to the peanut harvest. Although it is not possible to find an alternative weed control measure as perfect as herbicide, abovementioned three methods can be adopted as practices of integrated weed management in organic or nature farming systems.

Keywords: Nature farming, organic farming, organic fertilizer, residue mulch, smother crop, weed control.

Excessive uses of chemicals as fertilizer, pesticides and herbicides have caused pollutions and degradations of both living environment and food for human being. Concerns over the environment and public health have prompted our agricultural scientists and policymakers to reevaluated the practices in modern agricultural production. Recently, alternative production system such as environment-friendly agriculture, ecological agriculture, organic agriculture and nature farming have received great attentions (Stockdale et al., 2001; Xu, 2000). However, many difficulties and questions are faced by the farmers and scientists. A lot of alternatives of the production practices have to be tried and tested in organic agriculture. Weed control is one of the most important practices in addition to disease and pest managements in nature farming or organic farming crop production. In pest and disease managements, natural or plant materials, predator insects can be used as alternatives of chemical pesticides to suppress the pathogens or kill the pest insects (Basdow, 1995; Keel and Defago, 1997). However, for weeds control there is no alternatives of herbicides. Integrated weed control practices combined with cultivation measures have been tried and adopted in organic agriculture (Liebman and Gallandt, 1997). Integrated weed control should have a broader focus than weed control alone and should be integrated with other crop production practices that affect the ecosystems (Walker and Buchman, 1982). These measures including planting time (Davies et al, 1997), crop residual mulching (Rasmussen and Ascard, 1995), intercropping (Swanton and Weise, 1991), rowing spacing (Malik et al., 1993.) and mechanical weeding (Stonehouse et al., 1996). It has been reported that surface application of a microbially fermented organic fertilizer called 'EM bokashi' depresses weeds germination in paddy fields (Iwaishi and Umemura, 1999). Here, EM means effective microorganisms containing many species of beneficial microbes and EM bokashi means an organic compost anaerobically fermented using materials such as rice bran, oil mill sludge and fish processing by-product with EM inoculated to the materials before fermentation. However, it is not yet known whether EM bokashi is effective in weeds suppression in dryland field. In the present research, EM bokashi was applied to the soil surface before soybean seeds were sown and effects of EM bokashi on weeds population and on crop yield were examined.

Another alternative practical measure is to use crop residual on the soil surface to smother weeds (Swanton and Weise 1991). In Japan, crop residual mulch is often used in vegetable production for weed control in both conventional and organic agriculture systems. The benefits of it is not only in weed control but also include preventing crops from infections by soil-born pathogens, reducing soil erosion and nutrient leaching, and improving soil structure, soil properties, biological diversity, soil water conservation, and the consequent growth and yield (Barns and Putnam, 1983; Putman and De-Frank, 1983; Mohler, 1991; Liebl et al., 1992; Ateh and Doll, 1996: Swanton and Murphy, 1996). Mulch using crop residuals that are moved in from outside is widely used for production of pumpkin and other Cucurbita spp. In the present research, mulching treatment was adopted in a different way. Pumpkins were sown between the rows of rye crop before harvest. The standing rye crop residuals were used for mulching after the ears were harvested. One more experiment conducted in this research was intercropping with other crops or green to smother weeds as another practical measure in integrated weed control. A legume crop, peanut, was intercropped with the main crop of tomato to smother the weeds. The object of this research is first to test the effectiveness of the abovementioned practices separately with different main crops.

Materials and Methods

Experiment 1: Soil Surface Application of A Bioactive Organic Fertilizer

A bioactive organic fertilizer was applied 300 g m-2 and a compound fertilizer (N:P:K=15:15:15) was applied 60g m-2 as in control plot. The organic fertilizer was fermented using oil cake, rice bran and fish meal as materials with EM (Effective Microorganisms) inoculated before fermentation. On June 15, 2001, seven days after the organic fertilizer, white mycelia spread on the soil surface. Seeds of soybean ((Glycine max (L.) Merr. cv. Tachinagaha) seeds were sown by a small sowing machine, with two seeds per hole, 25 cm between holes and 40 cm between rows. Three weeks after seeds sown, weeds and soybean seedlings were examined. Then the field was ploughed to mix the organic fertilizer deeper than before. Soybean was sown once more and weeds were examined again three weeks after the second sowing.

Experiment 2: Pigtailed Rye Residuals as Mulch to Control Weeds in Pumpkin Field

Rye (Secale cereale L. cv. INFRC R-1) was sown in October, 2001 in an experimental field of fine Andosol soil, with a total nitrogen content, available phosphorus, and available potassium of 3.5, 0.03 and 0.45 g kg-1, respectively, and a C: N ratio of 13 before fertilized. An organic fertilizer was applied in comparison with a compound chemical fertilizer. The organic fertilizer was fermented using oil seed sludge, rice bran and fish meal, with a total nitrogen, phosphorus and potassium with concentration of 51,18 and 19 g kg-1 respectively. The organic fertilizer was applied 167 g m-2. A chemical fertilizer (N-P-K: 13-16-17) was applied with the available total nitrogen equivalent to that in the organic fertilizer. Mulched plots were compared with bare fallow plots. Three pumpkin cultivars (Cucurbita moschata Duch. cv. NFRC K-7, Fuyu-umaka & Nippon-aka) were sown between rye rows, on 6 June 2002, before ears were harvested. The space was 2.0 m between rows and 0.4 m between plants. Ears of rye were harvested with the stalks remaining in the field, and the stalks were braided onto the ground in pigtail style as mulch. Fruit yield was recorded and soil respiration was measured using a LI-6400 equipment (LI-COR Co., Ltd., Lincoln, Nebraska).

Experiment 3: Peanut Intercropped into Tomato to Smother Weeds

One row of peanut (Arachis hypogaea L. cv. Lainong 1) was intercropped between two rows of tomato plants (Lycopersicon esculentum). The fertilization was made as in Experiment 1. Tomato fruit yield was examined.

Results and Discussion

Weed Control by Applying Organic Fertilizer in the Soil Surface Layer

Many microbes including fungus and actinomyces thrived in the surface soil layer one week after the bioactive organic fertilizer was applied (Fig.1). As shown in Table 1, 20 days after sowing, the density of weeds was reduced to half of the control and the biomass of weeds was reduced to a quarter of control. At the time of 37 days after sowing, density of the weeds maintained the same as at the time of 20 days after sowing, i.e., half less dense in organic plot than in chemical plot, but the weed biomass in organic plot increased from a quarter to half of the control (Table 2). This was attributed to the increased biomass per plant because of the lowered density. In the experiment of the second time of sowing, both density and biomass of weeds were reduced more than 30% compared with the chemical fertilizer control (Table 3). This suggested that seeds of capable to germinate were reduced by the organic fertilization. The examined microbial quantity and the soil respiration rate were much higher in organic plots than in chemical fertilizer plot. However, from results of the present experiment, crop seeds cannot be sown immediately after application of the organic fertilizer, and if so, crop seeds will also be damaged (Table 4). Sowing is suggested after the aerobic fermentation of the organic fertilizer in the surface soil layer is completed and the surface soil containing the decomposed organic fertilizer was incorporated into the 0-20 cm soil layer. With this kind of application manner, not only weeds were suppressed but also the nutrients in organic fertilizer were mineralized and became available for crops. Consequently, a good crop growth and a high seed yield were obtained as expected.

Such an organic fertilizer is also used to control weeds in paddy field in Japan (Iwaishi and Umemura, 1999). This organic fertilizer ferments and decomposes continuously in the surface soil layer of the paddy field and a layer of soft mud formed as a consequence. Weed seeds cannot stay in this layer, sinks down to the deeper layer and loses their germination potential. Moreover, applications of this organic fertilizer promote populations of earthworms, mainly B. sowerbyi BEDDARD, which disturb the weed germination and establishment by their activities in the mud layer. Although mechanisms of weed control in dryland field by application of organic fertilizer are completely different from the case of paddy field, it may be adopted as one of the integrated weed control practices in organic farming systems. There has no research report recording the positive effect of organic fertilizer on weed control. Usually, an organic fertilizer produced from animal manure and plant materials contains weed seeds and makes problems of weed seeds introduction and disperse in crop field (Mt. Pleasant and Schlather, 1994). However, in the present research, the organic fertilizer does not contain any weed seeds and there is no such a problem as mentioned above. The bioactive organic fertilizer was anaerobically fermented with lactic bacteria and yeast inoculated and the organic materials, oil cake, rice bran and fish meal, were maintained fresh and raw before used. When the organic fertilizer was applied into the surface soil layer, aerobic fermentation occurred. Many fungi thrived fast and the mycelia spread in this surface soil layer. The surface soil layer was blocked and became hard (Fig.1). Oxygen might be cut from the outside the soil by hard surface layer and used up by the organic decomposition inside the soil. In a consequence, the seeds of weeds were damaged or kept from germination because of oxygen shortage. Moreover, the fungi might be the pathogens of the weed seeds as mentioned by Kremer (1993), who isolated fungi from rotting weed seeds. Other research has also shown that fungi infect weed seed and decrease weed seedbank and fungicides increase weed seed survival (Longsdale, 1993; Roeth, 1992). The organic fertilizer used in the present research promoted fast propagation of fungi, many of which might infect weed seeds. The mechanisms for the organic fertilizer in weed control should be examined more in details.

Fig. 1. Field of soybean seedlings with organic (upper) and chemical fertilization (Left: before sowing).

Table 1. Weeds in plots of soybean with chemical and organic fertilization 20 days after the first sowing

Weed name	Weed density (Plant m^{-2})		Weed dry mass (g m^{-2})	
	Chemical	Organic	Chemical	Organic
Portulaca oleracea	*280.0 ±25.0a*	*116.0 ±35.4b*	*27.0 ±1.9A*	*7.3 ±3.0B*
Digitaria ciliaris	*55.3 ±22.4a*	*44.7 ±20.7a*	*8.3 ±3.3a*	*3.1±0.1a*
Echinochloa crusgalli	*32.7 ±8.7a*	*56.7 ±1.3 b*	*0.6 ±0.03a*	*0.5 ±0.1a*
Senecio vulgaris	*68.0 ±13.3A*	*7.3 ±3.7B*	*6.0 ±1.4A*	*0.1 ±0.1B*
Amaranthus lividus	*1.3 ±0.7A*	*0.0 ±0.0 B*	*0.2 ±0.2A*	*0.0 ±0.0B*
Equisetum arvense	*0.7 ±0.7A*	*0.0 ±0.0B*	*0.1 ±0.1 A*	*0.0 ±0.0B*
Total	438.0	224.7	42.2	11.1

Table 2. Weeds in plots of soybean with chemical and organic fertilization 37 days after the first sowing

Weed name	Weed density (Plant m^{-2})		Weed dry mass (g m^{-2})	
	Chemical	Organic	Chemical	Organic
Portulaca oleracea	*290.0 ±7.2 a*	*122.7±22.6 b*	*249.1±85.9 A*	*177.5±27.2 B*
Digitaria ciliaris	*53.3 ±7.4 a*	*63.3±22.7 a*	*127.3 ±39.6 a*	*111.9±4.1 a*
Echinochloa crusgalli	*14.0 ±1.2 A*	*17.3±28.8 B*	*2.5 ±0.2 a*	*3.4 ±8.9 b*
Senecio vulgaris	*80.0 ±28.7A*	*6.7±2.7 B*	*96.8±32.5 A*	*4.4 ±1.4 B*
Amaranthus lividus	*1.3 ±0.7 A*	*0.0±0.0 B*	*10.1 ±6.4 A*	*0.0±0.0 B*
Total	438.6	210.0485.8	328.5	

Table 3. Weeds in plots of soybean with chemical and organic fertilization 20 days after the 2nd sowing

Weed name	Weed density (Plant m^{-2})		Weed dry mass (g m^{-2})	
	Chemical	Organic	Chemical	Organic
Portulaca oleracea	*598.0 ±65.9a*	*426.0 ±10.3b*	*220.9 ±35.6a*	*140.8 ±59.4*
Digitaria ciliaris	*32.0 ±7.2a*	*41.3 ±13.8a*	*7.1±5.2a*	*6.7 ±2.8a*
Echinochloa crusgalli	*13.3 ±1.8a*	*46.7 ±11.8b*	*0.3 ±0.1a*	*1.1 ±0.7a*
Total	643.3	514.0	228.3	148.6

Table 4. Effect of chemical and organic fertilizers on growth and seed development of soybean plants

---------Treatment----------		Emergency	Dry mass	Nodule number	--Nodule fresh mass---	
Experiment	Fertilizer	(%)	(g/plant)	(/plant)	(mg/plant)	(mg/nodule)
First sowing	Chemical	75.2 A	0.50 a	24.7 a	32.0 a	1.30 b
	Organic	33.9 B	0.40 b	21.2 a	32.6 a	1.54 a
Second sowing		Chemical	75.0 b	0.87 a	10.8 a	13.3 a 1.23 b
	Organic	81.3 a	0.91 a	7.5 a	11.7 a	1.56 a

First sowing, 1 June 2000; Second sowing, 5 July 2000.

Weed Control by Pigtailed Rye Residuals in Pumpkin Field

Density and biomass of weeds were much less in mulched plots than in bare field plot as shown by the pictures in Fig. 2. The weeds could not thrive for whole summer even when the pigtailed much rotted. Moreover, compared with the bare field cultivation, pumpkin crop with residual mulch got less infected by powdery mildew and other fungi. Rye plants before harvest protected pumpkin seedlings from infection of aphids. More soil fauna were found in plots of residual mulch, especially under the pigtail-shaped residuals. Therefore, the final fruit yield in mulched plots was higher than in bare tillage plots (Table 5). Soil respiration beneath the mulch was higher than in the bare fallow soil and this might be due to high activities of soil microorganisms. During the growth of pumpkins, the vine sprawled onto the mulch (Fig. 2), which not only separated fruits from the soil, but also suppressed weed emergence and the latter affect positively the fruit production. In the present experiment, the organic farming cultivars, 'INFRC K-7' and 'Fuyu-umaka', were bred in nature farming conditions. The two cultivars with organic fertilization produced fruit yield close to or higher than that with chemical fertilization. However, the conventional cultivar, 'Nippon-aka', produced lower fruit yield in organic plots than in chemical fertilization plots. Although the operation of mulching has to be improved, residual mulching treatment as done in the present work can be a good practice to suppress weeds and prevent from disease infection and is suitable for organic agriculture.

Using plant residues on soil surface to smother weeds has long been adopted as one alternative approach to the uses of chemical herbicides (Swanton and Weise, 1991). Residues can be the remaining of the preceding main crop or the preceding cover crop and moved-in residues from outside the field. Residues are widely used in the conservative tillage systems. In these cases residues play multiple roles in reducing soil erosion and nutrient leaching, improving soil structure, and increasing soil organic matter in addition to suppressing weeds (Barnes and Putnam, 1983; Putnam and Defrank, 1983; Mohler, 1991; loebl et al., 1992; Ateh and Doll, 1996; Swanton and Murphy, 1996). In Japan, rice straw is usually moved in as soil surface mulch from outside to vegetable field or apple orchard. It costs money and labor to store and move the rice straw for vegetables. In the present research, rye, or wheat in another case, was grown in the winter time as one of the main crops and also as a cover crop. Pumpkins were sown between the rye rows before the rye were harvested. Ears of rye were harvested with the stalks remaining in the field. Then the stalks were braided onto the ground in pigtail style. It would be more effective if some organic fertilizer or fresh grass residues were spread under the pigtailed mulch. The pigtailed mulch tightly attached to the soil surface and weeds could not emerge from under the mulch. The mulch also maintained soil moisture and provided a good environment for soil biota, i.e., the soil fauna and soil microorganisms. This was reflected by the soil respiration under the mulch. For a large scale of production, it is possible to use mechanic tool with the farm machine to make the mulch in pigtail type. As one of the practices in integrated weed management, the pigtailed mulching may be expected with a good effect in organic farming crop production.

Fig. 2. Pigtailed rye mulch in pumpkin field (Upper-left: weeds thrived in unmulched plot; Upper-right: weeds were controlled by residual mulch; Lower-left: pumpkin vine sprawled onto the mulch; Lower-right: Mulch began to rot.

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Table 5. Fruit yield (kg plant^{-1}) and soil respiration (CO_2 umol.m^{-2}.S^{-1}) in organic fertilized plot (Org) and chemical fertilized plot in pumpkin production

Treatment	Fruit yield			Soil Respiration
	INFRC Ｋ-7	Fuyu-umaka	Nippon-aka	(μmol m^{-2} s^{-1})
Organic-Mulch	0.69±0.10	0.91±0.11	0.63±0.13	9.38±0.06
Chemical-Mulch	0.56±0.09	0.85±0.05	0.94±0.13	7.58±0.30
Chemical-Bare	0.54±0.07	0.69±0.07	0.71±0.10	4.38±0.24

Intercropping Peanut to Smother Weeds in Main Crop Tomato.

As shown in Table 6, the accumulated fruit yield up to 74 days after sowing was higher in tomato plants with peanut intercropped. The yield increasing was more than 10% in both organic and chemical fertilization treatment. The yield increasing was attributed to enlarged fruit size and there was no difference in fruit number per plant between treatments. The economic income from peanut was not calculated in the present research because it is not the main crop. Although the biomass of weeds was not examined, weeds were clearly smothered by peanut plants in the intercropping plots. Different from other plants, peanut is a legume crop and it is able to fix nitrogen from the air. In additional to the weed smothering effect, peanut might interact in nitrogen nutrition with the main crop tomato, at least the peanut might not compete with tomato plants for nitrogen nutrition. Similar nitrogen release and supply by legume green manure crops were confirmed by Stute and Posner (1995) in cornfield. Peanut plants covered the soil surface between tomato row and suppressed weeds as found by McLenaghen et al. (1996). Dyck et al. (1995) have once conducted a field study using crimson clover (Trifolium incarnatum) as green manure in sweet corn field and confirmed the contributive effect of legume green manure in weed management. Boydston and Hang (1995) have obtained weed suppressive effect and potato yield increase by a non-legume plant, rapeseed (Brassica napus var. napus), as green manure. With their research results, many scientists suggest that allelopathic interaction between the green manure plants or the plant residues and the main crop may have been responsible for the weed suppressive effect of green manure (Doolan, 1997; Dyck and Liebman, 1994; Gallandt et al., 1998; Liebman et al., 1995; Westoby et al., 1996; White et al., 1989). Combination of tomato and peanut, which covers the horizontal space together over the soil surface with different vertical canopy structure, minimized the invasion of weeds. As mentioned by Cardina et al. (1999) and Reader (1991), the cover crop can be selected to provide habitat for weed seed predators that are capable of reducing weed seed survival and elicit allelopathic chemicals that are capable to inhibit weed emergence and establishment. Smother crops, such as peanut used in the present experiment, have also been used in crop rotation between two main croppings to suppress the growth of weeds and break cycles of weed infestation associated with the production of the specific main crops (Robbins et al., 1942). A smother crop shades out weeds by its rapid growth and thick canopy. Often used smother crops are alfalfa (Madicago sativa), buckwheat (Fagopyrum esculentum), foxtail millet (Setaria italica), and rye (Secale cereale).

Table 6. Fruit yield of tomato plants with peanut intercropped.

------Treatment------		--------Red Fruit--------		-------Green fruit-------		-----Total Fruit---	
Fertilizer	Peanut	kg/plant	No./plant	kg/plant	No./plant	kg/plant	No./plant
Organic	No	0.68±0.12	6.3±0.8	0.54±0.15	6.8±1.7	1.22±0.20	13.0±1.7 ab
Organic	Yes	0.81±0.04	6.3±0.3	0.56±0.04	7.3±0.3	1.38±0.09	13.5±0.3 ab
Chemical	No	0.85±0.12	5.8±0.6	0.60±0.20	6.8±1.9	1.45±0.17	12.5±1.6 a
Chemical	Yes	0.89±0.14	6.0±1.1	0.73±0.11	7.3±0.3	1.62±0.09	13.3±0.9 b

Conclusion

As a new and special measure, the bioactive organic fertilizer aerobically re-fermented when applied into the surface soil layer and promoted microbial propagation. Weed population was depressed by more than 50% due to the soil surface fermentation and the microorganisms. As a practice often used in the conservative crop production, pigtailed mulch with residues of winter rye depressed weeds significantly and increased pumpkin fruit yield. As a smother crop, peanut was intercropped into tomato crop depressed weeds and increased tomato fruit yield more 10% in addition to the peanut harvest. In the present research three practices were operated separately for three different crops. More effectiveness could be expected if the three or more practices were adopted in one cropping system. Further research is needed for the integrated, multiple and interactive weeds management in organic crop production systems.

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Organic Cultivation of Vanilla – Varanashi Method

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Abstract : Varanashi Farms, a certified organic farm situated in coastal Karnataka, India, is successfully growing vanilla with high productivity in an eco-friendly mixed farming system. The Farm has recorded an average yield of 265 g dry beans per support plant. The pest and disease problems are minimum in the farm. The paper describes the cultivation practices evolved and adopted in the farm.

Key words: vanilla, organic cultivation, composting, mixed farming

Introduction

Vanilla – a tropical Orchid vine - grows on a support plant under shade in nature. This climber produces roots from every node which move downwards attached to the support plant establishing and spreading profusely on the humus layer of the soil just under the degrading organic matter.

The true vanilla beans possess a delicate spicy flavour and peculiar bouquet that is not duplicated exactly by synthetic product (Rosengarten, 1969). It is grown in tropical countries but mostly consumed in European and North American countries. Today, in these countries, organically grown spices like vanilla command higher price.

Description of the project

Varanashi Farms (VF), Adyanadka is situated in the southwest side of Karnataka State, India and is about 25 km away from Arabian Sea. The Farm is certified organic (by SKAL) growing various plantation crops. Vanilla is successfully cultivated here with high productivity.

Climate, topography and soil

Adyanadka is at 120 m above MSL. The land is undulating with small hillocks. The weather data of the region are given below: Annual rainfall : 3500 mm (mostly from June to November.)

Temperature : Max.: 28 - 35oC
Min.: 18 - 24oC

Humidity : 60 – 90 %

Particulars of the VF soil are: Texture: Sandy loam; pH: slight acidic (5.5 – 6.5); organic matter content : high; available phosphorus content : low and available potash: low to medium.

Mixed farming: key to sustainability

To make its cultivation more sustainable, vanilla is grown as mixed crop using arecanut, coconut, teak, cashewnut and even natural forest trees as support/shade plants in Varanashi Farms (Fig.1 to 4). Depending upon the combination, vanilla is directly planted over the shade/support tree (in case of cashewnut, arecanut and small wild tree species) or on the preferred support plant gliricidia (in case of coconut and teak). The spacing varies from 2.1 to 2.7 m.

Fig.1: Vanilla along with cashew

Fig.2: Vanilla along with teak

Semi-degraded compost: ideal

Vanilla roots need good aeration. It is a perennial crop and requires continuous supply of nutrients. So, a semi-degraded compost of fibrous material like coir pith,

Fig.3: Vanilla with coconut and black pepper Fig.4: Vanilla in a forest system

arecanut husk are more ideal (Moorthy, 2004). These materials do not contain enough nutrients; and so, compost is prepared from them by addition of nitrogen-rich materials like poultry manure, which also supplies enough phosphorus. VRF Method of Composting (Moorthy et. al., 1997) is most appropriate way to prepare compost and is adopted in VF.

Fig.5: Compost by VRF method

Right quantity and time of manuring

Beginning of the summer (March) is the most appropriate time for planting of vanilla. While planting a healthy one-meter cutting, about 10-15 kg of semi-degraded compost is applied to a thickness of 2-3 cm around the support planted with vanilla(Fig.6). A thin layer of litter is applied immediately on the cessation of monsoon in November, after which matured vanilla plants undergo moisture stress during the winter. This favours flower induction. When good number of plants put forth the flower, compost is applied at the rate of 10-15 kg in February-March (Fig.7). Additional 10 kg application is applied once or twice at monthly interval, thereafter. Manuring and nutrient spray are avoided during the rainy season and also after September, when the plants switch over to the reproductive phase. The flowers have to be hand pollinated individually as and when they open in the forenoon hours. In order to get lengthy robust beans, only restricted numbers of flowers are pollinated.

Fig.6: Newly planted vanilla applied with compost

Nutrient spray boosts the growth

The aerial roots as well as foliage of vanilla absorb the nutrients when given as spray. During summer months, nutrient spray is given once in 7-10 days. At VF,

Varanashi Biospray (1:40) (a decoction of specially prepared compost enriched with beneficial micro-organisms) is given as foliar spray alternating with cattle urine (1:10 dilution). In certain areas, biogas slurry (about 1:4) is used to feed the root zone once in 30-60 days.

Fig.7: Compost to the yielding plant

Irrigation to give moisture and to reduce temperature

This part of the country receives very high rainfall from June to November, followed by prolonged dry period. So, proper irrigation is a must for vanilla. Overhead irrigation is most ideal. For younger plants as the monsoon recedes, irrigation is given at the rate of 5-10 mm once in 3-4 days. For yielding plants, no irrigation is given 1-2 months after the rains (during winter) and plant undergoes stress. When the plants begin

Fig.8: Mist irrigation for vanilla

to put up flower buds, irrigation is given initially 5-10 mm once in 3-4 days. After March, as the temperature goes up vanilla plants are irrigated once/twice every day (restricting the quantity from 1 to 3 mm) which helps to control the bean dropping due to high temperature. Care is taken not to over irrigate. At VF, part of the vanilla gardens has regular sprinkler system whereas in certain new gardens, mist system is in operation(Fig.8).

Organic and mixed farming: minimum pests and diseases

In VF, the pest and disease problems are minimum. Birds and predatory insects control most of the insect pests. In addition, mechanical control is also practised. For fungal problem, especially for Phytophthora rot noticed during rainy season, Bordeaux (1%) is sprayed to the crop. The immature bean dropping due to pests and diseases and also the insect blemishes on the beans in VF in comparison with two other farms are given in Table-1. The droppings and insect damage blemish are less in VF compared to the other farms where chemicals are used. Proper training of the vines also plays a major role in reducing pest and disease problems. At VF, the individual plants are pruned and trained in such a way that it gives multiple hangings. Weak branches, yielded branches and non-yielded old branches are regularly removed to avoid over crowding.

Table-1. Pest and disease problems in Vanilla at VF and other farms during 2003-04

Name of the Farm	Immature bean droppings (%)	Insect blemishes (%)
Varanashi Farms	12.2	< 5
A friends farm – 5 km away	60	> 80
A Farm in Kalpetta (which received award for highest yield)	50	> 60

Harvest and yield

Matured beans are harvested individually. Then they undergo processing and curing following improved traditional methods (Ashwini, 2004). The process is quite labour-intensive, delicate and lasts for three to four months. At VF, as detailed earlier, vanilla is grown in a mixed farming system with different combinations.
The vanilla yield data for four years from a sample block in VF are furnished in Table-2. In this block, vanilla was planted in 1996 on cashew having close spacing (4 m x 4 m) for the sake of scion sticks.

Table-2. Vanilla yield at VF

Year	Yield of cured vanilla per support plant (g)
2002	296
2003	121
2004	258
2005	384 (estimated)
Average	265

Reports indicate that the good yield of vanilla varies (80 g per plant - Rosengarten, 1969, 166 g - Anonymous, 2000 and 300 g Suryanarayan, 2004). At VF the yield has varied from 121 g to 384 g averaging 265 g for four years thus comparing well with the reported yield.

Fig.9: A healthy crop

Cost

Depending upon the crop mixture, the cost of establishing new vanilla plant on a support plant in VF varies from Indian Rupees 125 to 150 (US$ 2.84 to 3.4) and annual maintenance cost is Rs. 50 to 75 (US$ 1.13 to 1.70). On an average, the production cost is Rs. 400 (US$ 9.09) where in cost of pre-bearing period is also accounted.

Conclusion

During the last 10 years, vanilla has been successfully grown in VF by adopting organic farming techniques. During the last 2-3 years, due to various reasons, the production of vanilla is short of the demand, which has escalated the prices to phenomenal heights. This has induced wide spread cultivation of the crop not only in traditional areas even in hostile conditions adopting artificial methods. Already the prices are showing declining trend and most of the farms established with high cost will be non-sustainable and non-economical. Organic farming is cheaper and more sustainable. The land that has come to us would be, thus, properly utilised and passed on to next generation in a sustainable condition.

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RESPONSE OF ORGANIC MULCHING PRACTICES ON WEED ANAGEMENT AND YIELD OF COTTON

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Abstract : A field experiment was conducted at Annamalai University Experimental Farm, Annamalainagar to study the effect of mulching practices on weed control, growth and yield of cotton during 1999. The experiment was laid out in randomised block design replicated four times. Six treatments viz., no mulch (control), mulching with water hyacinth (*Eichhornia crassipes*) at 10 cm thickness, coir pith at 2 cm thickness, saw dust at 2 cm thickness, paddy straw at 10 cm thickness and sugarcane trash at 10 cm thickness were tested. Among the mulching treatments, sugarcane trash at 10 cm thickness significantly decreased the weed count, weed biomass and increased the weed control efficiency, weed control index and growth and yield of cotton. Application of coir pith was the next best treatment. Results evidently proved that all the mulching treatments caused suppressing of weeds and there by improved the seed cotton yield. This technology could be considered as eco-friendly, which also takes care of the soil fertility maintenance.

Key Words : Cotton, mulches, weed control efficiency, weed count, weed dry matter.

INTRODUCTION

Cotton is an important fibre crop of Tamil Nadu. In some parts of Tamil Nadu and Andhra Pradesh, cotton is also grown in rice fallows after the harvest of rabi rice. The average seed cotton yield in rice fallow is very low as the crop faces severe competition from weeds during the initial stage of growth. Slow crop growth during early period coupled with wider row spacing of cotton favours the weed to make a rank growth. Nutrient depletion to the tune of 10 to 90 per cent (Singh et al., 1988) causes major set back to the crop. In order to make judicious use of various inputs, it is essential to keep the weed under check from early stages of the crop growth. Weed control through herbicide has harmful effect on non-target species and herbicidal residues in edible parts cause severe mammalian toxicity. Weed control through organic mulch is eco-friendly in nature and leaves no residual toxicity to the environment. Mulching is said to be one of the best means to combat weeds by avoiding aeration and by increasing the soil temperature by 5 to 10 per cent (Song Meizhen et al., 1998). This resultant increase in soil temperature has been reported to be lethal to many soil inhibiting pests including weeds. Mulch also provides a barrier against emerging weeds (Rao, 1983) and thus has post emergence weed control ability. Keeping this in view, the present investigation was carried out to study the effect of organic mulching practices on weed management, growth and yield of cotton.

Materials and methods

A field investigation was conducted to study the effect of mulching on weed control in cotton during winter 1999 at Annamalai University Experimental farm, Annamalainagar, India. The experiment was conducted in randomised block design with four replications with six treatments viz., no mulch (control), mulching with water hyacinth (Eichhornia crassipes) at 10 cm thickness, coripith at 2 cm thickness, sawdust at 2 cm thickness, paddy straw at 10 cm thickness and sugarcane trash at 10 cm thickness. The soil is clayey loam in nature. The available nitrogen, phosphorus and potassium contents of soil were 222, 25 and 351 kg / ha respectively. Cotton cv Suvin was sown on the first week of January 1999 and the method of sowing was dibbling with a spacing of 60 x 30 cm. A fertilizer schedule of 80 kg N, 40 kg P2O5 and 40 kg K2O / ha was applied through organic manures. The different mulch materials as per treatments were separately spread over the surface of each bed in the inter row and intra row space of cotton at 10 DAS. The mulch material was spread at a specified thickness as per the treatment schedule. First irrigation was given two weeks after sowing and subsequent ones as and when needed. The recommended plant protection measures were adopted. Data on plant height, monopodial and sympodial branches, seed cotton yield and weed count and dry weight of weeds were recorded.

Result and Discussion

Weed flora observed in cropped field
The major weed flora found during the cropping season were Trianthema portulacastrum L., Eleusine indica (L), Digitaria sangunalis (L.) Scop besides other as Cynodon dactylon L., Cyperus rotundus L., Commelina benghalensis L. and Amaranthus viridis L. were present in the experimental field.
Effect on weed population, weed dry matter and WCE
There was a significant reduction in weed population and dry weight of weeds with the mulching treatments as compared to no mulch. Sugar cane trash at 10 cm thickness reduced weed population and weed dry matter and increased the weed control efficiency than other treatments. The growth of weeds in the mulch treatments was poor. This could be due to blocking of sunlight and aeration. Similar results were reported by Kaliappa (1980) and Cui Fengjun et al. (1994), Coir pith at 2 cm thickness was the next best. The no mulch (control) recorded the highest weed count and dry matter production.

Table 1 : Effect on weed population, weed dry weight and WCE

Treatments	Weed number / m^2	Weed DMP (g / m^2)	Weed Control Efficiency (%)
Weedy check	225	157.5	-
Water hyacinth at 10 cm thickness	51	40.25	77.33
Coir pith at 2 cm thickness	34	28.50	84.00
Saw dust at 2 cm thickness	106	79.50	52.88
Paddy straw at 10 cm thickness	78	58.25	65.33
Sugarcane trash at 10 cm thickness	20	15.19	91.00
CD at 5%	12.8	7.51	-

Effect on crop yield

Mulching treatments significantly increased the growth and yield components and seed cotton yield than the no mulch treatment. Sugarcane trash mulch at 10 cm thickness recorded the highest number of monopodial branches (2.85), sympodial branches (12.98) and seed cotton yield (1464 kg / ha). Increased growth and yield of cotton observed in sugarcane trash mulching treatment might be due to the beneficial effect of mulches in conserving soil moisture and in suppressing the emerging weeds, thereby influencing the growth and yield components of crop and finally seed cotton yield. Kathiresan et al. (1991) reported that sugarcane trash mulch conserved the soil moisture by avoiding weed growth in sugarcane. Coir pith at 2 cm thickness was the next best treatment. The lowest seed cotton yield (733 kg / ha) was observed with no mulch obviously, severe weed competition and relatively slow growth of cotton during early stages resulted in low cotton yield in the above treatment.

Table 2 : Effect on monopodial and sympodial branches and number of bolls per plant

Treatments	Monopodial branches	Sympodial branches	Number of bolls / plant	Seed cotton yield kg / ha
T_1- Weedy check	2.11	8.96	6.8	733
T_2 – Water hyacinth at 10 cm thickness	2.56	11.34	8.8	1052
T_3 – Coir pith at 2 cm thickness	2.62	12.11	9.9	1315
T_4 – Saw dust at 2 cm thickness	2.33	9.44	7.1	986
T_5 – Paddy straw at 10 cm thickness	2.42	10.77	7.6	858
T_6 – Sugarcane trash at 10 cm thickness	2.85	12.98	10.8	1464
CD at 5%	0.28	0.35	0.54	22.50

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The practice of organic tea in China

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Abstract: Since first batch of organic tea was produced early in 1990, Organic tea has developed rapidly in China. 17 provinces and municipality produced organic tea in 2003. Research item on technology has carried out in 11 provinces and municipality and some of item has successes. Up till now there are three kind of production model of organic tea in china, such as, company model, corporations model company associated with farmers, and smallholder Group. Each model is respectively 51%, 23% and 18% of all certificated bodies. Now the output of organic tea is about 8000 ton that is 1.1% of total output. Organic tea plantation is more than 15000 ha. Organic tea exported to EU, America, Japan, etc. Organic tea is retailed in 26 provinces and municipality. The organic tea industry is formed which organic fertilizer, biotic pesticide and plant pesticide produced. Organic tea become a focus of tea economy in recent year. About 86% certificated corporation's benefit from organic tea. Farmer's income increase and a part of farmer that produce organic tea live in mountain area are far from poverty. The organic tea plays important roll in the rural economy. OTRDC apply oneself to set up a corporation systems between the producer and trader, for share the information of market and decrease the cost of sell, keep the organic tea sustain development. There are many advantages to develop organic tea in China. The most of tea plantation locate on mountain area has best entironment; some of technology and means of tradition agriculture can be used in organic agriculture too. Government encourage develop organic agriculture.

Key words: organic tea, China

1. Conspectus on Chinese organic tea

The first batch of organic tea exported to Holland in China at 1990. Because the price is higher than common tea, the company got benefits. Then organic tea is exploited in Zhejing, Jiangxi and Anhui provinces. Some of organic tea has exported to Europe, Japan and America. The price is tower above one half than the common tea. According to international development trend, Zhejinag province put the project of organic tea in practice. Thereafter some provinces of producing tea set up the plan of organic tea from 2004 till 2006 (table.1).

table.1：The organic tea plans of some provinces

province	Area (ha)	Output (ton)
Zhejinag(2005)	6666.7	5000
Jiangxi(2004)		6000
Hubei(2005)	3000	1500
Yunan(2005)	1330	
Hunan(2005)	3300	
Fujian（2006）	2000	3000

Organic tea has developing at a rapid rate since 1990. Up to end of 2003 it is estimated that the area of organic tea is 15,000ha. The organic tea plantation spread in provinces of Zhejiang, Yunan, Hubei, Hunan, Jiangxi, Anhui and Fujian etc. The output of organic tea of these provinces is attained 8000 tons, accounting for 1.1% of total output of China. 270 corporations are certificated by OTRDC; it is about 75% in all of organic tea corporations. The output is about 40% of total organic tea. The organic tea products include 2700 tons tea, more than 30,000 tons of read drinking tea, 870 ton rapid dissolve tea and condensed liquor. OTRDC is one of largest certification organization in China, Other are OFDC and COPCC. Abroad organizations that join certification activity in China include IMO, BCS, ECOCERT, OICA and JONA etc.

2.The main models of organic tea production

After ten years of the development, there are three models of organic tea production in China. First is company model, second is corporations model which the company associated with farmers, and another is farmer group. Among the certificated body, company model occupied 51%, and other separately occupied 23 % and 18 %. In these producing model, there are different advantage and shortcoming.
The company model is easy to manage. The company directly managed the plantation, processing, and selling systems as well as product brands and criterions by him. The quality of organic tea is stable, and their benefits are better. In the second model, the trade corporation is a main part of the association, which associates with some of tea farmers or plantation forming a large-scale plantation area. This model is easy to broaden the scale of area and products. Recently a new model of tea farmer group emerges along with the society progression. That is associating many farmers; each farmer is a small tea garden holder. They are voluntarily to form the organic tea group, carry out same production regulation and management rules of organic tea. The farmers strictly control the material of production and build tea factories for processing. The group applies organic tea certification and use the same logo. The smallholder groups appear in recent year as a new model of fitting business tendency that is supported by government's.

3.Benefit of organic tea

During this recent ten years, the products configuration of Chinese tea industry has changed. The famous tea and nice quality tea popularized in the market with the standard of living improving. Government arouses the enterprise produced nice quality organic teas for the market to benefit in the local market. In 2003, 100 certificated bodies were investigated by OTRDC. 86% of certificated body had good benefits and 97% enterprises answer organic teas were easily to sold (table 2).

Table 2: Benefit survey to re-certificated enterprises

Benefit Increase 50%	Benefit Increase 30%	Benefit Increase 10%	Equal to before	Lower before	Tea easily Sold	Tea no Sold
14%	36%	36%	11%	3%	97%	3%

Organic teas promote tea industry progress in some regions. For instance, Wuyi County of Zhejiang Province developed organic teas since 1995. Up to the end of 2003, there were 16 enterprises of certificated. The area of organic tea garden is more than 1000ha, and the value of organic tea is 43.9 million RMB Yuan. The organic tea value is 37,155 Yuan per ha. and common tea value is only 15,375 Yuan per ha. Farmer obtained good benefit for producing organic tea. As this reason 367 ha of desolation and semi-desolation teagarden were rebuilt into organic tea garden. From 2000 to 2003 the local farmer got accession income 3.7 million Yuan. Wuyi County gained the reputation ——home of Chinese organic tea. So many companies of out of county join Wuyi to develop organic tea and safe tea.

In mountain area of Xiuning County Anhui Province, the tea farmers get rid of poverty by produce organic tea. At Youlong Village there are 480 populations belong to 131 families, and area of teagardens are 108 ha. Villagers produced organic teas from 1999 and sold in Beijing and other cities. The incomes of tea farmers increase year by year. In 2002, the average income of this village is 1600 Yuan that it is two times of that of 2001. In 2003, though suffer the rarely drought, the income of per family is still maintain 5700 Yuan. The income per person is 2600 Yuan; it is 10.7 times compared 242 Yuan of 5 years ago. Nowadays this village becomes a rich village.

4.Organic tea market

Organic tea is sold in market both domestic and abroad. Organic green tea and steam tea that is the main products export to Europe, America and Japan etc. In domestic market, the main products are nice quality green tea. The output is about 3000 tons; the value is about 180 million Yuan.

4.1Promote the consume in domestic markets

Large-scale introductive activity is hold by OTRDC at least one times annually for consumers to know the organic tea. Early or late, there are operated nice quality organic tea taste party, organic tea exhibition, organic tea publicizing weeks in Hangzhou, Beijing and Anhui. To introduce the organic tea idea, trend of world organic agriculture, organic tea technology, by means of the news paper, TV program. Organized some of training classes and introduced the product characteristic in the consumer school. Through organized some large scale exhibiting activities, some of media focus organic tea. Some of trader of tea advertises on the media. Up till now organic tea consume increase at Beijing markets through 5 years activity.
It is an important means of organic tea industry sustain the steady development that set up a corporation system between the producer and trader. A corporation meeting of producer and trader holds annually after 2003. Nowadays more than 70 members of cooperation joined this system; they are share the information of organic tea market. The producer supplied goods for the trader. The trader sells organic tea in northern China so as to decrease the sell cost of producer. This system help the producer know the trend of market and help the trader find the product.

Absorb the big company join this system for strengthen organic tea industry power. Wahaha group-company (Hangzhou) that is the third register of China read drink tea manufacture certificated organic read drink tea. The company made a large amount of advertises of organic tea and spread on more than 20 TV studio all over China. These advertise that is first organic food of China spread abroad organic tea idea. Now some of large scale of tea companies joins organic tea industry.

5.Many advantages of developing organic tea

After the Fifth Conference of IFOAM-Asian Organic Agriculture, the government begins to regard organic agriculture. Agriculture ministry indicate some of enterprise and region where have good conditions must develop organic agriculture and green food in 2002. In this year Agriculture ministry issued "organic tea " criterion. Promulgated by Decree No. 399 of the State Council of the People's Republic of China <Regulations of the People's Republic of China on Certification and Accreditation> on Sep, 2003. All certification body must be approved by the certification and accreditation regulatory department of the State Council. Up to now about 30 bodies are approved to certificate organic food in China.
There are many advantages of farm fields where can be used for organic tea in China. The tea trees are varied. Some of area's agriculture is stay in traditional agriculture stage. Most of tea garden located in mountain or upland area didn't suffer the pollution. Otherwise some of tea garden almost didn't used chemical materials especial in deep mountain and poverty area. Ecological agriculture start in 1980, some technology such as circulatory resource permanent utilization can be used in organic agriculture. Some of research items are carrying by technologist. Some of problem such as fertilizer and pesticide should be solved. There are many advantages of developing organic tea in China.

6.The problems wait for resolve

- the certification of Chinese organization didn't accept by abroad
- Lack of teacher in organic agriculture education. Up till now, organic agriculture course didn't start in university or college.
- Lack of support by international organizations.

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"Benign Environment and Safe Food"
7th – 11th September 2004. Yangpyung / Korea

Organic production of German Chamomile *(Matricaria chamomilla L.)* intercropped with Pot Marigold *(Calendula officinalis L.)*

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Abstract : Effects of organic production of German Chamomile intercropped with Pot Marigold, on agronomic criteria and chemical composition of German Chamomile was studied in a split plot design with three applications. Treatments were four levels of animal manure (0, 30, 40 and 50 tons/ha) as main plots and five seeding ratio of German Chamomile with Pot Marigold (100:0, 75:25, 50:50, 25:75 and 0:100) as sub plots. Results showed that animal manure has no effects on total dry matter of Matricaria chamomilla. However with decreasing proportion of seeding rates of German Chamomile in the mixture, leaf area, total dry matter yield and seed yield of German Chamomile was reduced. Chamazulene content of essential oil was affected by leaf area and seed yield. Seeding ratios of 50:50 or 25:75 were the most promising seeding rates in terms of Chamazulene content.

Keywords: Organic farming; Matricaria chamomilla; Calendula officinalis; Chamazulene; Manure.

Introduction

German Chamomile is one of the old medicinal plants and it has been used by humans since the Roman era (4). Since the fifteen century, its beneficial essential oil has been recognized and widely used (2). Overutilization in natural habitats has been severe and therefore for the last few decades cultivation of these plants in many European countries including Finland, Czech, Slovenia, Germany and Greek has been practiced. German Chamomile has not been produced widely under cultivation in Iran. However In natural habitats, different species of German Chamomile are grown but German Chamomile is the most widespread (3). Rechinger (11) has reported the natural distribution area of this species as Iran, Pakistan, India, China and Japan. Essential oils of German Chamomile are mainly of terpenoids, or terpenoid based compounds (1, 5). However the medicinal significant of German Chamomile is due to compounds such as α-bisabulol, Cineol, Maricarin, Matricin and Chamazulene, the most important of which is Chamazulene. Matricin is a predecessor of Chamazulene and its content is regarded as an index for Chamazulene content. Essential oil 's content of German Chamomile is 0.24 to 1.9 percent of fresh weight of the flowers. By proceeding the age of plants, the amount of essential oil and its composition is changed (6). Environmental conditions also affect essential oil content and sunny days enhance the amount of these compounds (7). Optimum temperature of 20 to 40 oC has also been recorded for Chamazulene accumulation (9). Beginning of flowering period and in the second growth period Chamazulene content is higher (7, 8). Spring planting has been reported to improve Chamazulene content compared to autumn planting and tube flowers which consist 70% of the total flower weight contains higher essential oils (1). Nitrogen is important in biosynthesis of essential oils and therefore nitrogen fertilizers have positive effects on these compounds (10). However, in organic production systems these chemical are not allowed and therefore the aim of this study was to find out how this medicinal plant responds to organic farming systems in terms of quality and agronomic criteria.

Material and Methods

This experiment was conducted in experimental farm of the Faculty of Agriculture, Ferdowsi University of Mashad, Iran in 2002-2003.Animal manure was applied in advance for further decomposition and planting was carried out in early March. Seeds were mixed with saw dust for a better uniformity of distribution in time of planting. An split plot with 3 replications in complete randomized block arrangement was used with 0, 30, 40 and 50 tons/ha of animal manure as mail plots and 5 levels of seed mixture ratio of 100:0, 70:25, 50:50, 25:75, 0:100 for German Chamomile and Pot Marigold as sub plots. Plot dimensions were 8*4 meters and seeds were sown on both side of rows with 40 centimeter between rows and 8 centimeter within rows for German Chamomile and 15 centimeter for pot Marigold. Weeding were done by hand as required and all other practices were based on organic production procedures. Harvesting of flowers was conducted when more than 50% of flowers were open. Factors such as flower yield, total dry matter yield, leaf area, seed yield and Chamazulene content were determined.

Results and discussion

Results showed that application of animal manure had no effect on total dry matter yield (Fig 1).

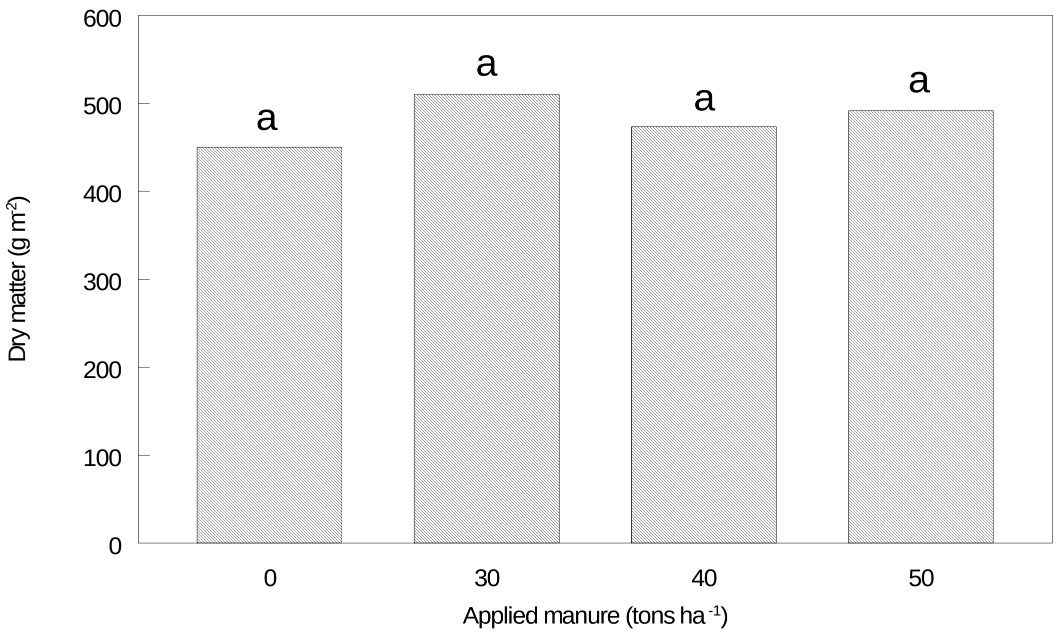

Figure 1. Effect of manure levels on German Chamomile dry matter yield

Leaf area index for German Chamomile was reduced by application of manure. Although this parameter showed no particular trend in response to seed mixture ratio, but the highest value was obtained in 50:50 seed mixture (Fig 2-a). However, total dry matter yield of German Chamomile was significantly affected by seed mixture ratio (Fig 2-b), where the highest DM was obtained in 100:0 and the yield reduced was proportional to the reduction of seed in the mixture.

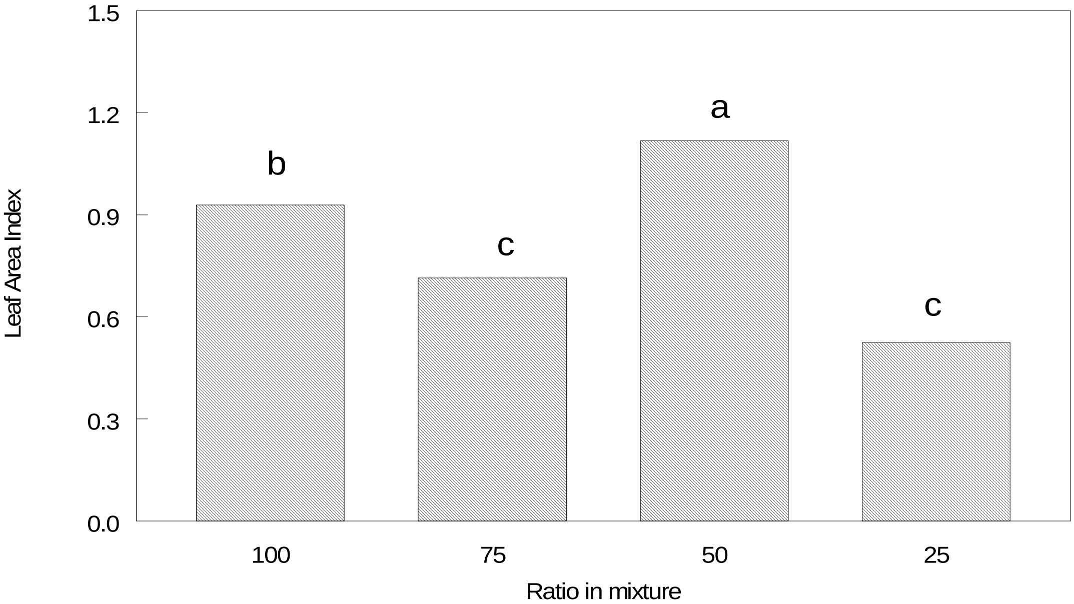

Figure 2-a: Effect of Ratio in mixture of German Chamomile and Pot Marigold on German Chamomile Leaf Area Index

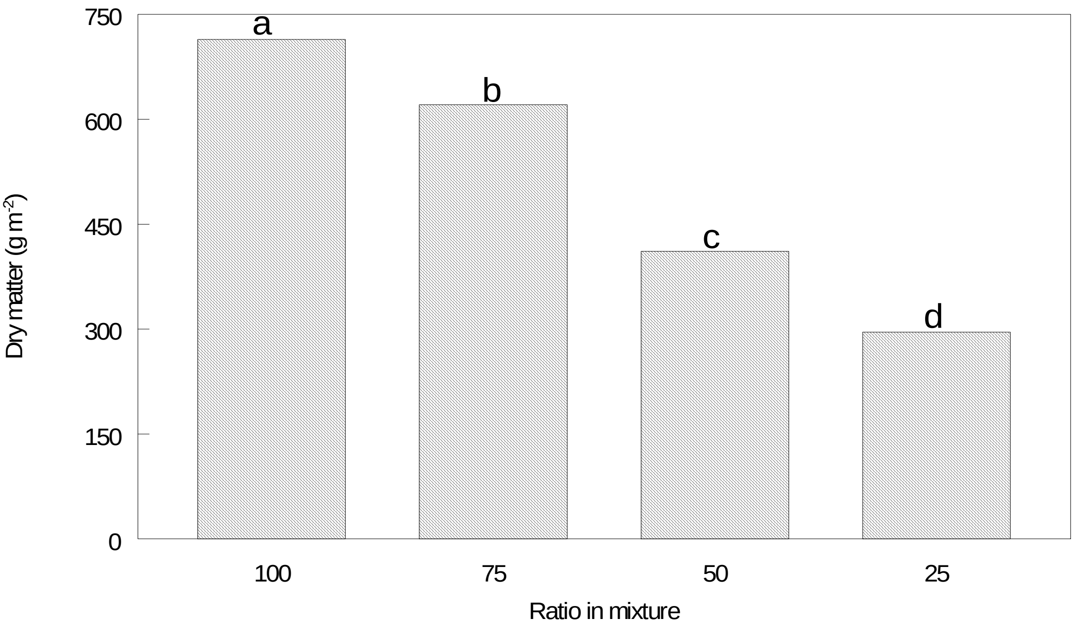

Figure 2-b: Effect of Ratio in mixture of German Chamomile and Pot Marigold on German Chamomile dry matter yield

In other words by reducing the proportion of seed of German Chamomile in the mixture, its DM yield was reduced. This is not an unexpected case because by doing that, plant density is reduced and hence dry matter yield. Seed weight was also showed the same trend in response to the seed mixture ratio. In other words seed yield of 100:0 was 2.5 times higher than seed yield in 25:75 ratio (Fig 2-c). This has been reported for other plants in mixtures too (12, 13). However yield in mixture is higher than in pure culture; due to better efficiency in utilization of resources (14).

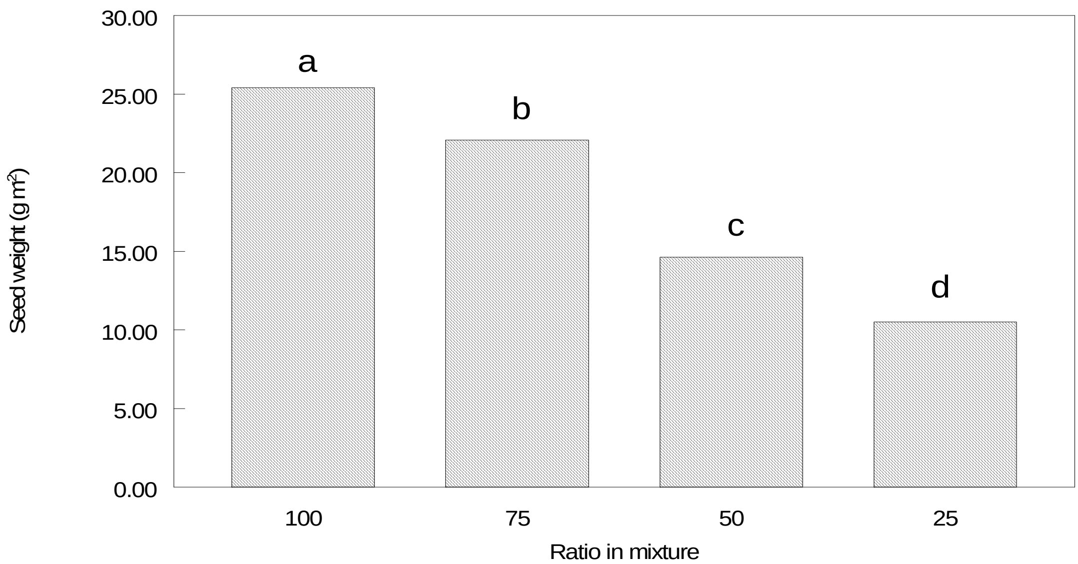

Figure 2-c: Effect of Ratio in mixture of German Chamomile and Pot Marigold on German Chamomile seed weight

Chamazulene content was reduced by application of animal manure and there was no differences between the amount of applied manure (Fig 3-a). By reducing the ratio of German Chamomile seed in the mixture, Chamazulene content was significantly increased (Fig 3-b).

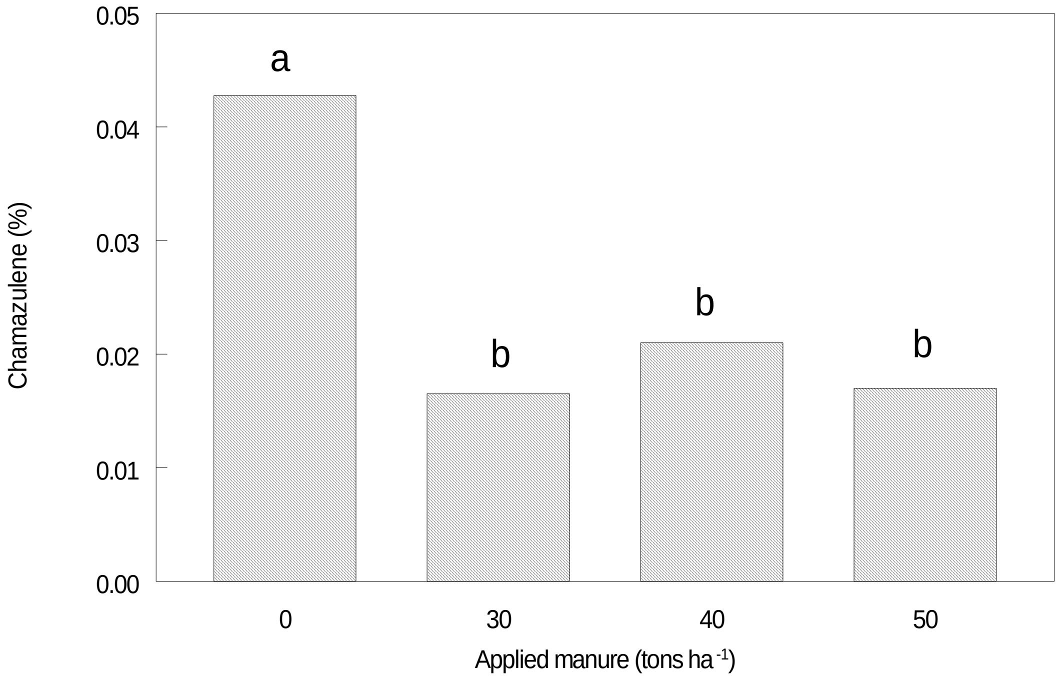

Figure 3-a: Effect of manure levels on Chamazulene content

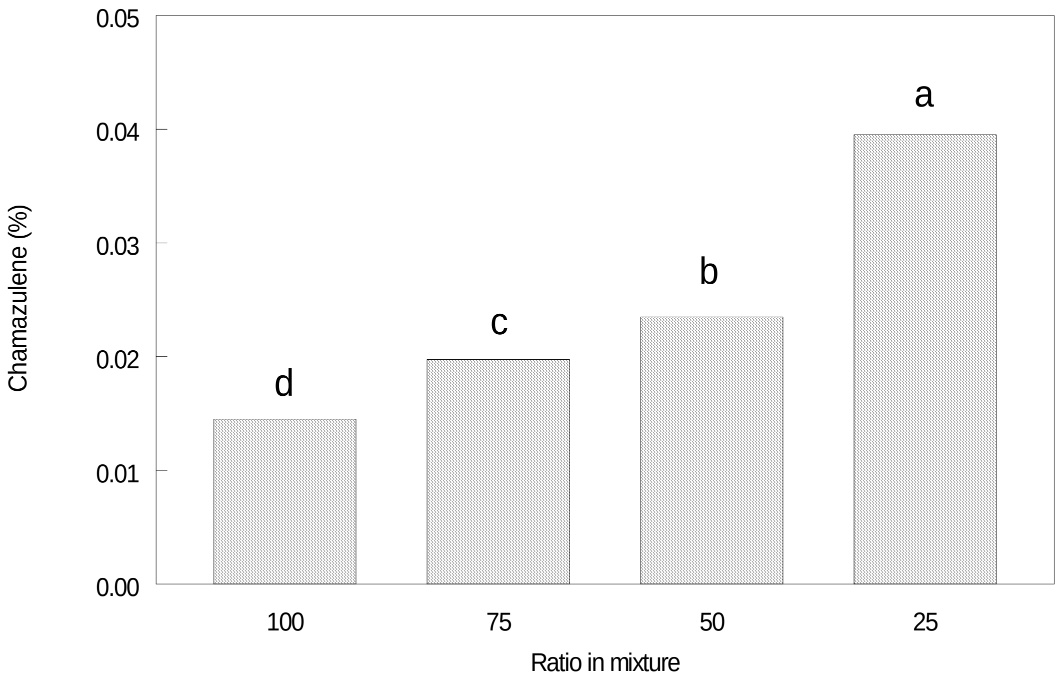

Figure 3-b: Effect of Ratio in mixture of German Chamomile and Pot Marigold on Chamazulene content

Figure 4 shows that by increasing dry matter yield, Chamazulene content were initially reduced up to 0.02% (flower dry weight) and thereafter it was almost unchanged.

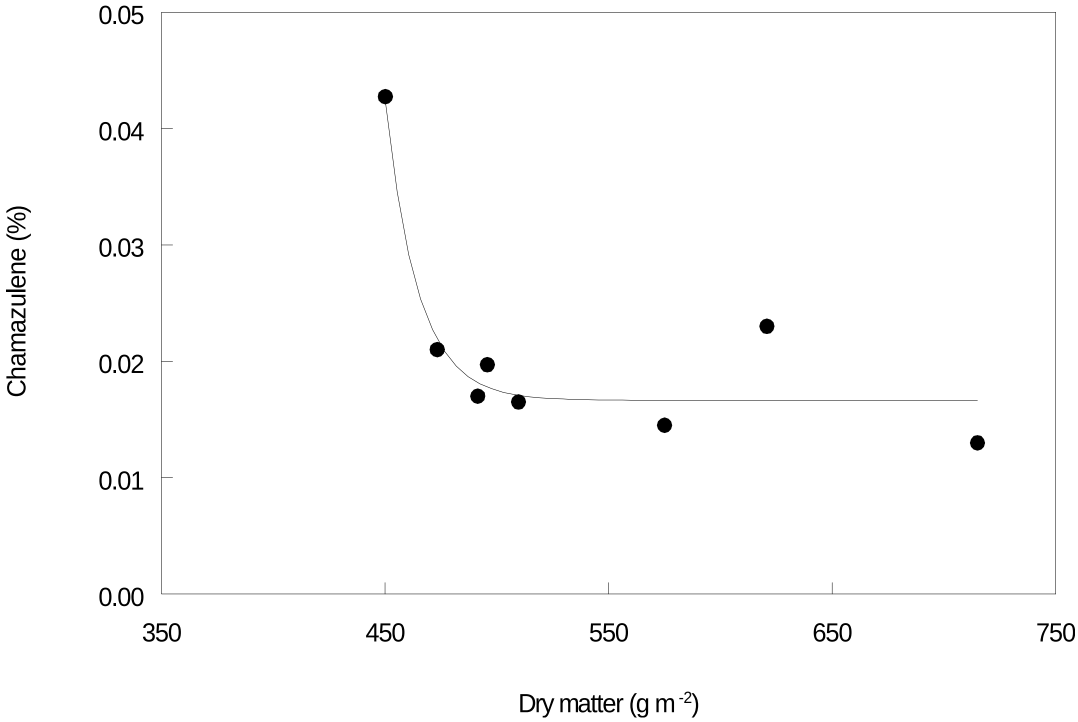

Figure 4: Changes in Chamazulene content associated with German Chamomile dry matter yield

Leaf area index showed a positive relationship with chamazulene content (Fig 5-a). However, at leaf area index lower than 1.4, Chamazulene content was relatively constant. Seed yield showed a negative relationship with Chamazulene content (Fig 5-b).

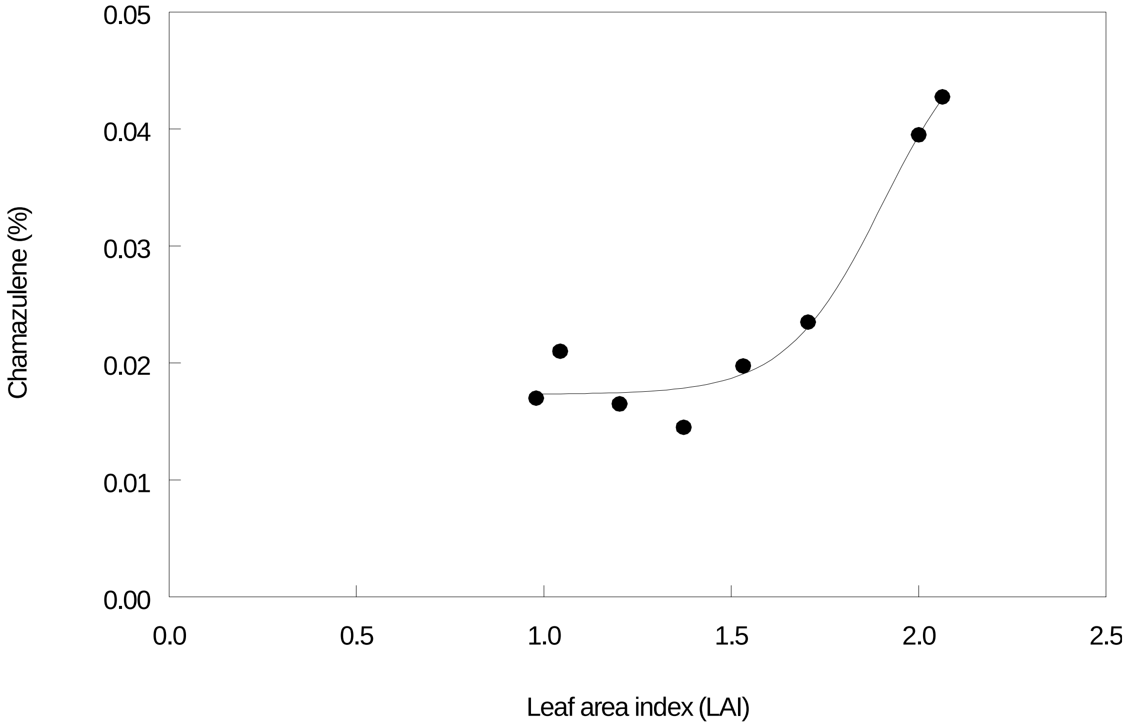

Figure 5-a: Changes in Chamazulene content associated with German Chamomile Leaf Area Index

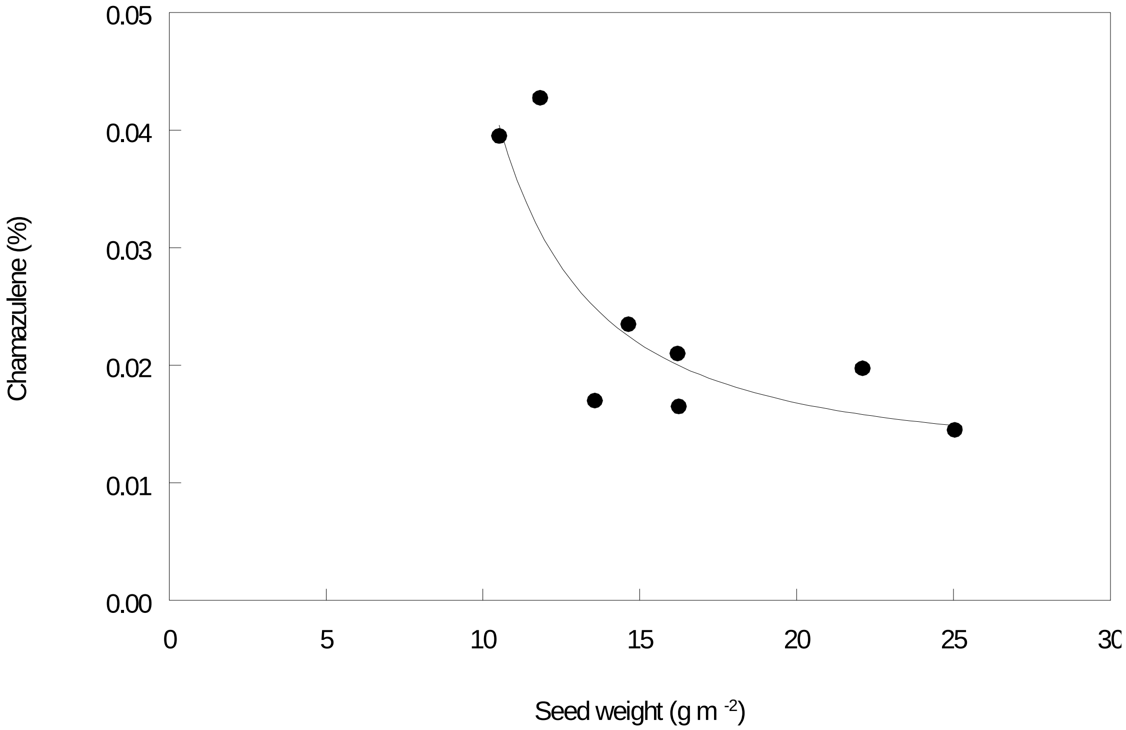

Figure 5-b: Changes in Chamazulene content associated with German Chamomile seed weight

By comparing Figs 5-b and 2-b it appears that the effect of seed yield on Chamazulene content in comparison to the effects of leaf area index and total dry matter yield is more pronounced where the factors which have a negative effects on seed yield, caused an increase in Chamazulene content.

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Searching for Potential Biopesticides against yellow vein mosaic virus disease of Okra

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Abstract : Yellow vein mosaic virus disease is the predominant disease of okra infecting all the parts of the plant causing a great loss in fruit yield and quality in the Indian subcontinent. This is transmitted mainly by an insect-vector, Bemisia tabaci Genn. Insecticidal control measure of this vector is still not only cost-effective and efficient but also hazardous to environment. Locally available, low cost and eco-friendly Plant origin products were tried in the present investigation. Among the five plant products viz. powder of root, seed, leaf and root extract of drumstick (Moringa olifera Lam.) Neem (Azadirachta Indica Adr. Juss.) leaf powder, Turmeric (Curcuma longa L.) rhizome powder and Babla (Acacia nilotica Del.) bark powder, tested all the plant parts of Moringa especially of root and seed powder, exhibited comparatively lower YVMV disease incidence, whitefly population and also recorded higher fruit yield. Neem leaf powder and Babla bark powder also showed promising results on reducing YVMV infection in okra.

Key words : Okra, Plant Product, Yellow vein mosaic virus.

Introduction

Okra (Albelmoschus esculentus (L1) Moench.) is an important summer vegetable crop grown throughout India for its tender fleshy fruits. Yellow vein mosaic, a major viral disease associated with okra cultivation in India subcontinent, is caused by Hibiscus virus–1 (Uppal et al., 1940). This disease causes vein clearing, followed by veinal chlorosis of leaves and dwarfing, malforming and yellowing of fruits, resulting in significant losses of both quality and yield of fruits (Shastry and Singh, 1973). An early infection may cause yield losses as high as 95.7 per cent (Pun and Doraiswamy, 1999). This virus is transmitted in nature by an insect vector, Bemisia tabaci Genn. Hence, several attempts were reported to reduce the disease through application of insecticidal control measure against the insect vector (Khan and Mukhopadhyay, 1985b; Handa and Datta Gupta, 1993 and Debnath and Nath, 2002), but still, YVMV is considered most destructive disease of okra due to non-availability of efficient and cost effective insecticidal control method which is also hazardous to environment as well human health. Therefore, different plant products which are less expensive and eco-friendly in nature are being exploited for managing viral disease in recent years (Surendran, 1999). Application of formulated solution (3%) of Asafoetida which is the dried latex collected from living rootstocks or taproots of Ferula foetida Regel and E. assafoetida Linn., Showed to prevent 90% viral infection by means of it's insect repellent action (Singh et al., 1999). Neem (Azadirachta indica Adr. Juss) seed kernel extract (5%) was found effective against bemisia tabaci Genn. on bringal crop (Srinivasan and Sundarababu, 2001).

In the present investigation, attempts has been made to search for cost effective, environment friendly and locally available plant products for effective control of YVMV disease in Okra.

Materials and Methods

The trial comprised of eight formulation of different plant products along with only water spray were studied on the incidence of yellow vein mosaic virus disease of Okra during 1999–2000 (Table – 1). The methods of application were only seed treatment, only spraying and seed treatment followed by spraying. All the plant products were applied @ 2 gm powder per litre of water except moringa root extract which was used @ 2 ml per litre of water. Seeds were treated by soaking seeds with solution of those plant products for 24 hours duration. Certified seeds of Seven Dhari Green, a local susceptible variety, were sown in each plot of 10 m2 area maintaining a space of 60 cm row to row and 30 cm plant to plant distance in a row. The crop received a nutrition of Nitrogen, phosphorus and Potassium@ 100 : 80 : 80 kg/ha as N, P2O5 and K2O where full dose of phosphorus, potassium and half of nitrogen were mixed into the soil during final land preparation and rest half of the nitrogen was applied at 30 days after sowing of seeds. Both dust and liquid formulations of the plant products were used for seed treatment and spraying. The plants raised from the treated seeds were also sprayed with the plant products at 20, 40 and 60 days after sowing. Observations on the numbers of infected plants and number of white flies per plant from five plants in each plot were taken at final harvesting stage (75 days after sowing). Harvesting of fruits of each plot was done at regular interval and expressed in quintal per hectare. Collected data on disease incidence, whitefly population and fruit yield were pooled and analysed statistically in split plot design where methods of application and different plant products were placed in main and sub-plots respectively.

Results

Pooled analysis results as mean of effects of different plant products, application methods and their interaction on yellow vein mosaic virus disease of okra was summarised in Table 1, Fig 1 and Fig 2. All the botanical parts of drumstick (Moringa olifera Lam.) exhibited significant effect in reducing YVMV disease of okra followed by Babla (Acacia nilotica Del.) bark and Azadirachta indica Adr Juss leaf powder but except Mornga based products other did not differ significantly as compared to untreated control. The YVMV disease incidence in Moringa olifera seed powder, root extract, root and leaf powder treated plots were 50.38%, 51%, 52.26% and 52.23% respectively whereas, the Azadirachta leaf and Cassia bark powder applied okra plants showed YVMV disease as 55.75% and 55.4% respectively.

Moringa root extract, seed and root powder when applied both as seed treatment and spraying (3 times) YVMV disease on okra appeared at lower level which were 35.80%, 38.30% and 38.90% respectively with no significant difference among themselves whereas only spray application of those three Morniga products showed comparatively higher YVMV disease which were 53.85%, 49.20% and 55.70% respectively. Debnath and Nath (2002) also reported delay in YVMV disease occurrence in okra upto 60 days after sowing with the application of different botanical separates of Moringa.

Table 2 and Fig. 2 summarized the pooled analysis results of application of different plant products on whitefly population per plant expressed as mean effects of plant products application. Whitefly population per plant was also significantly influenced by the application of Moringa leaf powder (14.25) followed by root powder (15.06) and seed powder (17.55) but they did not differed significantly (Table 2) in regard to method of application. Lowest whitefly populatuin per plant was observed in Moringa root powder (11.55) followed by leaf powder (121.54) and seed powder (13.48) used as seed treatment coupled with three sprayings (Table 2). Similar efforts on whitefly (Bemisia tabaci Genn.) control in bringal and in cotton were tried by Srinivasan and Sundarababu (2001) and Manna et al., (2001) respectively.

The mean effects of different plant products methods of application and their interactions on fruit yield of okra were recorded in Table 3 and Fig.2. Significantly higher fruit yield of okra was obtained with the application of Maringa seed powder (2.16 t/ha) followed by its root extract (2.02 t/ha), Azadirachta leaf powder (2.01 t/ha) when they were used as seed treatment in conjunction with spraying, but there was no significant difference among them.

Discussion

Results reported above revealed that Moringa root extract, seed powder and root powder when applied as seed treatment followed by three sprayings at 20 days interval, commencing from 20 days after sowing, resulted lower incidence of YVMV disease. However, lowest whitefly (Bemisia tabaci Genn.) population was recorded in Moringa root powder followed by Moringa leaf and seed powder application through both seed treatment coupled with three sprayings. Moreover, highest fruit yield of okra was obtained in Moringa seed powder followed by Moringa root extract applied as seed treatment in conjunction with three sprayings. The higher efficiency in reducing YVMV disease of okra with the application of different Moringa based products was might be presence of alkaloids spirochin and marinignine. The alkaloid spirochin paralyses the vegus nerve of whitefly while moringinine acts on sympathetic nerve ending of the insect-vector resulting inactiveness of their sucking activity. Morriappan et al. (1982) reported that seeds of Azodirachta indica and Annona sp. was found to reduce transmissionof Tungro virus and survival was found to reduce transmission of Tungro virus and survival literature of its vector, Nephotettix virescens. Therefore, the present study clearly indicates that the plant products of Moringa hold a good promise as a “Biopesticide” to prevent YVMV infection in okra crop.

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Table 1 : Effect of different plant products and their methods of application on YVMV disease infestation of okra (pooled data of two years).

Methods of application / Plant products	BYVMV disease incidence (%)			
	Seed treatment	Spraying	Seed treatment + spraying	Mean
P1*	52.06 (62.20)**	48.26 (55.70)	38.59 (38.90)	46.30 (52.26)
P2	53.85 (65.20)	51.22 (60.75)	40.04 (41.40)	48.36 (55.78)
P3	55.22 (67.45)	47.26 (53.95)	42.64 (45.85)	48.37 (55.75)
P4	56.69 (69.85)	45.23 (50.40)	43.93 (48.15)	48.62 (56.13
P5	52.94 (63.65)	44.45 (49.20)	38.23 (38.30)	45.23 (50.38)
P6	54.31 (66.00)	43.92 (48.15)	40.87 (42.80)	46.36 (52.32)
P7	50.43 (59.40)	50.43 (59.40)	43.51 (47.40)	48.12 (55.40)
P8	52.73 (63.35)	47.20 (53.85)	36.75 (35.80)	45.55 (51.00)
P9	53.38 (64.45)	50.72 (59.90)	40.96 (42.95)	49.41 (55.77)
Mean	53.51 (64.40)	47.64 (53.85)	40.96 (42.95)	

	Plant products (PP)	Method of application (M)	PP × M
LSD0.05	1.21	0.59	1.77

P1* - Drumstick (Moringa olifera Lam.) root, P2 – Katki, P3 – Neem (Azadirachata indica Adr. Juss) leaf, P4 – Turmeric (curcuma longa) Powder, P5 – Drumstick seed, P6 – Drumstick leaf, P7 – Babla (Acacia nilotica Del.) bark powder, P8 – Drumstick root extract, P9 – Control. ** Actual disease incidence (%)

Table 2 : Effect of different plant products on whitefly population of okra under different methods of application (pooled data of two years).

Methods of application / Plant products	Whitefly population (Number / Plant)			
	Seed treatment	Spraying	Seed treatment + spraying	Mean
P1*	18.27	15.36	11.55	15.06
P2	19.81	18.03	15.83	17.89
P3	18.69	15.83	13.63	16.05
P4	18.82	15.39	14.51	16.24
P5	16.50	15.48	13.48	15.15
P6	15.93	14.29	12.54	14.25
P7	14.95	17.81	14.52	15.76
P8	17.14	15.82	15.03	15.99
P9	17.81	16.71	15.42	16.05
Mean	17.55	16.08	14.05	
LSD0.05	Plant products (PP) 1.78	Method of application (M) 1.15		PP × M 3.47

P1* - Drumstick (Moringa olifera Lam.) root, P2 – Katki, P3 – Neem (Azadirachta indica Adr. Juss) leaf, P4 – Turmeric (curcuma longa) Powder, P5 – Drumstick seed,
P6 – Drumstick leaf, P7 – Babla (Acacia nilotica Del.) bark powder, P8 – Drumstick root extract, P9 – Control.

Table 3 : Effect of different plant products on fruit yield of okra under various methods of application (pooled data of two years).

Methods of application / Plant products	Fruit yield (t/ha)			
	Seed treatment	Spraying	Seed treatment + spraying	Mean
P1*	1.43	1.06	1.89	1.46
P2	1.17	0.98	1.98	1.38
P3	1.27	1.24	2.03	1.51
P4	1.22	1.59	1.74	1.52
P5	1.58	1.54	2.16	1.76
P6	1.22	1.93	1.76	1.64
P7	1.10	1.75	1.24	1.36
P8	1.69	2.00	2.02	1.96
P9	0.49	1.05	1.05	0.87
Mean	1.24	1.47	1.77	
LSD0.05	Plant products (PP) 0.14	Method of application (M) 0.17		PP × M 0.52

P1* - Drumstick (Moringa olifera Lam.) root, P2 – Katki, P3 – Neem (Azadirachta indica Adr. Juss) leaf, P4 – Turmeric (curcuma longa) Powder, P5 – Drumstick seed,
P6 – Drumstick leaf, P7 – Babla (Acacia nilotica Del.) bark powder, P8 – Drumstick root extract, P9 – Control.

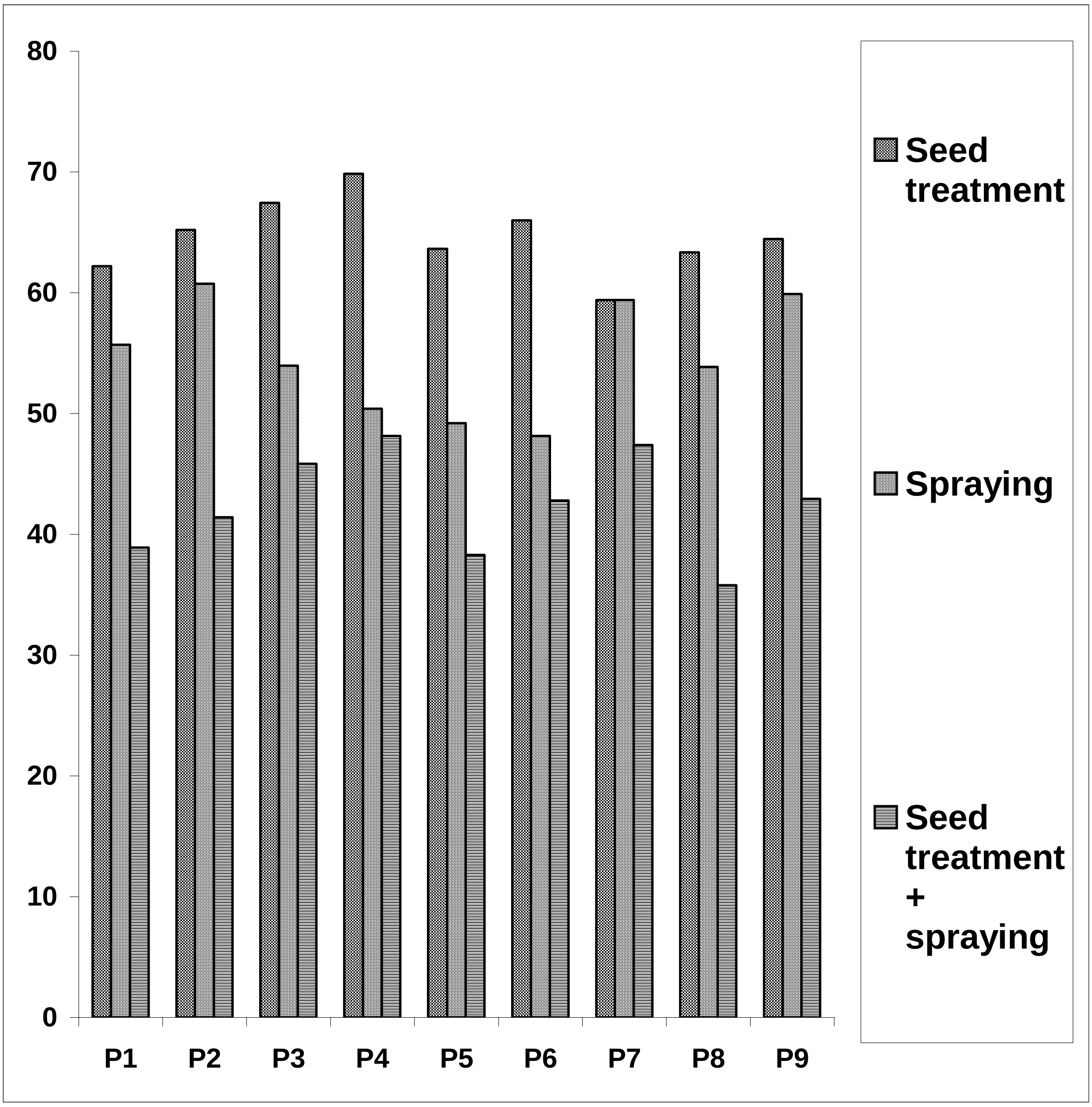

Fig. 1 : Effect of different plant products and their methods of application on YVMV disease of okra

P1 – Drumstick (Moringa olifera Lam.) root,
P2 – Katki,
P3 – Neem (Azadirachta indica Adr. Juss) leaf,
P4 – Turmeric (Curcuma longa) Powder,
P5 – Drumstick seed,
P6 – Drumstick leaf,
P7 – Babla (Acacia nilotica Del.) bark powder,
P8 – Drumstick root extract,
P9 – Control.

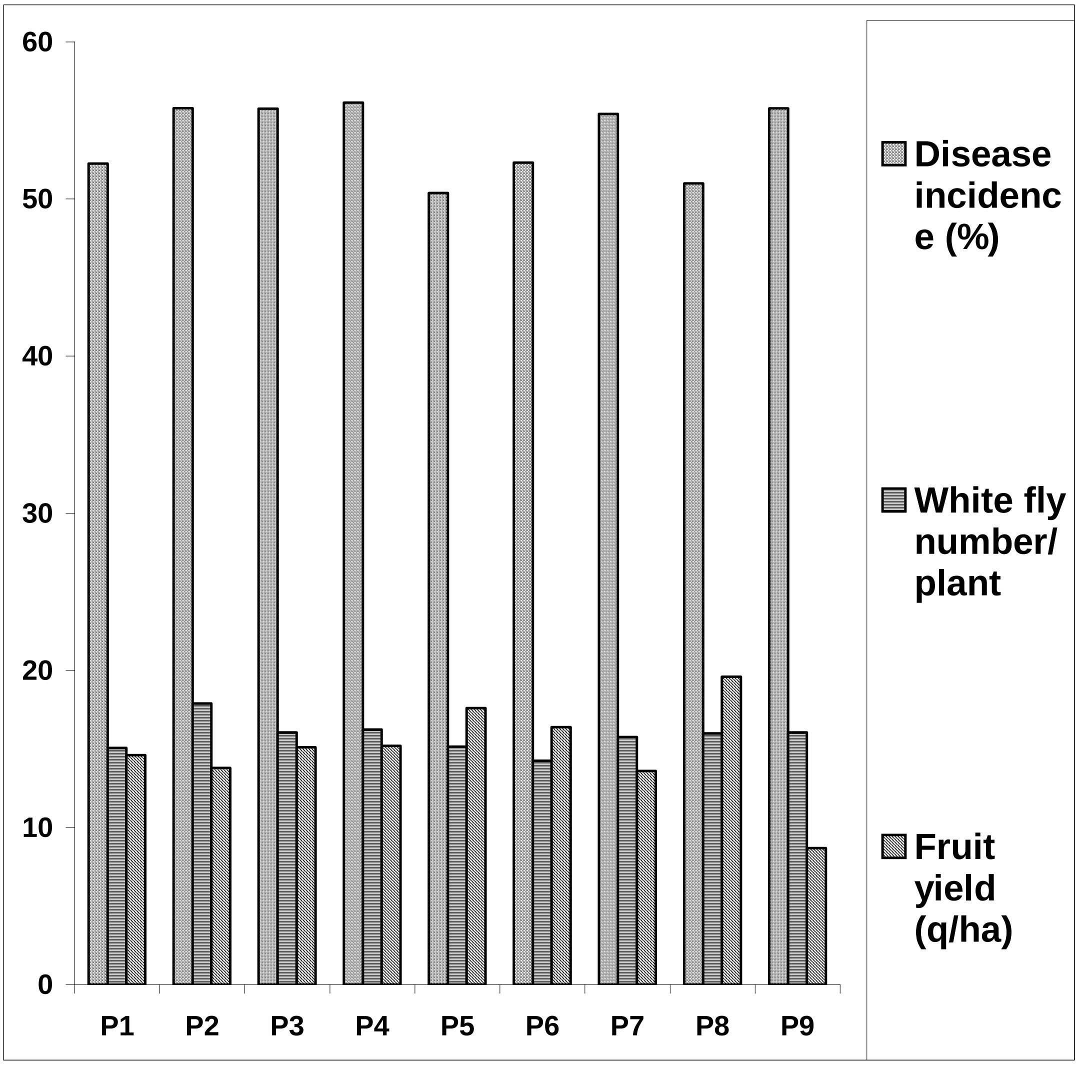

Fig. 2 : Effect of different plant products on YVMV disease, whitefly population and fruit yield of okra

P1 – Drumstick (Moringa olifera Lam.) root,
P2 – Katki,
P3 – Neem (Azadirachta indica Adr. Juss) leaf,
P4 – Turmeric (Curcuma longa) Powder,
P5 – Drumstick seed,
P6 – Drumstick leaf,
P7 – Babla (Acacia nilotica Del.) bark powder,
P8 – Drumstick root extract,
P9 – Control.

Crop protection in Organic Vegetables farming through the use of Melia azedarach

A field experiment on efficacy of Melia azedarach to cabbage aphid (Brevicorinae brassicae)

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Abstract : In order to assess the effectiveness botanical plant materials to cabbage aphid (Brevicoryne brassicae), an experiment was conducted in the research command area of Ecological Service Centre at Devghat-9, Gaight, Tanahun during the winter of 2001/2002. A total of two level of concentration such as 1:5 and 1:10 from the leaves of Bakaino (Melia azedarach L.) were applied to the aphid population in cabbage in five and ten days intervals. The result indicated that the 1:5 concentrated solution of Bakaino (Melia azedarach L.) extract in a five days interval was found to be effective in lowering down the aphid population compared to 1:10 even in the shorter period of application indicating the possibility of using botanical plant materials towards the development of organic pest management method.

Key words: Antifeedants, active ingredients, plant extract and nymphs

Introduction

Pests (including insects, diseases, weeds, rodents, and mites) are the major biotic constraints to increasing agricultural production. Improved agriculture is characterised on the external inputs such as chemical fertilisers and pesticides in an attempt to boost the productivity. Such practices, however, encouraged some pest species to grow at an economically important level. Application of pesticides to control pests has disturbed the natural balance, caused monetary losses throughout the need for more pesticide purchases. This in-trun has led to further outbreaks of secondary pests and increasing concern about environmental hazards. Alternatives to synthetic pesticides, such as organic pest management methods are now of utmost importance to control pests with a minimum of environmental hazards.

Farmers in Nepal have been using their own indigenous knowledge and practices to protect agricultural crops. Use of botanical materials is an age-old practice. Farmers from Western parts of Nepal are using Sisnu Pani (nettle water), titepati (Artimisia vulgaris), timur (Xanthoxylum sp) bojho (Acrocarpus sp) etc. as alternative means to manage the insects and diseases in vegetables and stored grains. According to Gyawali (1993), more than 50 species of plants have been used in Nepal in order to protect the crops and reduce pest damage. Use of an indigenous weed such as Chinopodium botrys against the potato tubermoth has been found as effective as a synthetic insecticide (Fenvelerate 0.02%) and even superior to Pyrethrum sp. (0.2%) (Pradhan, 1988). Local farmers use Euphorbia spp to control stem borers on cereals and plant Cycas and Cymbopogon spp around or in paddy bunds to repel some pests. However, the efficacy of these materials, possible changes during storage, optimum extraction methods and chemical composition are yet to be studied to a greater depth. The significance of plant materials to different types of insect pests could be either due to the effects of repellent, anti-feedants or toxicants etc. In Nepal, the active ingredients of such materials is neither identified nor characterised. Therefore, systematic research on these aspects is urgently needed.

Botanical pesticides are attractive alternatives to chemicals for a variety of reasons because, most of the solely chemical based technologies are likely to be worth for a few years before the insect build up resistance. While, the use of natural resources are more sustainable and cost effective, where there is less chance of resistance build up by the pests. The strategy seems more stable and sustainable from the technical, ecological, economical and environmental viewpoint. Moreover, they are beyond the reach of the poor farmers in Nepal. Whereas, botanical materials are easy to grow, use and the cost is often minimal. Most botanicals plants posses low toxicity compared to chemical pesticide, and their residues do not pollute the environment. However, their effectiveness, doses, suitable parts and method of extraction are yet to be determined against field pests. Looking into the growing concern about chemical pesticide, there is an urgency to revive and improve these traditional practices of pest management in order to integrate them into the ecologically sound pest management in Nepal. This situation has urged for an integrated approach of pest management with the increasing uses of natural resources and reduced reliance on chemical pesticides.

Among several plant species those have been used for the crop protection purposes, Melia azedarach is one of the popular and potential plant species. Melia azedarach is a moderate sized deciduous tree. It grows to a height of 9-12 metres. The bark is dark grey having shallow longitudinal furrows. Leaves are bipinnate or occasionally tripinnate with ovate or lanceolate, serrate leaflets. Flowers are lilac and fragrant. The fruits are ellipsoid globose having 4-5 seeds. It is grown in plain as well as hilly areas of Nepal as firewood and fodder in recent years. It has spreading crown. It can tolerate colder climate than neem. In coffee plantation it can be grown as shade tree. It flowers during hot weather and fruits ripen during the cold weather. The plant freely regenerates from seeds during rainy season.

Materials and Methods

Cabbage seedlings (var. Green Stone) were planted at a distance of 45 x 60 cm (row to row and plant to plant) applying farm yard organic manure and other cultural practices. No any external input such as chemical fertilisers and pesticides were applied during the crop life. Immediately after transplanting they were caged in with the nylon nets ensuring the whole plots coverage. A total of twelve seedlings were planted in a plot and altogether there were five plots in a replication. Aphid (Brevicoryne brassicae) of the same age batch of fifty per plant basis were inoculated and allowed to fed the plant parts.

Experiment was conducted in a randomised block design (RBD) with five treatments and three replications. The treatments used in the experiments were different concentration of Bakaino

(Melia azedarach L.) crude extract diluted with different proportion of water and spraying schedules. The crude extract was diluted in two different concentrations such as at 1:5 and 1:10 with water and spraying schedules were two different duration such as 5 and 10 days intervals. The treatments were arranged into factorial combination such as T1= 1:5 concentration at 5 days spraying interval, T2= 1:5 concentration after 10 days spraying interval, T3=1:10 concentration at 5 days spraying interval, T4= 1:10 concentration at 10 days interval and control (water application). The effect of botanical materials was recorded at every four days of spraying. Biological information such as number of insect per plot, number of dead insect per plant, scale of damage and total marketable yields were taken.

The insects were reared upon feeding the cabbage in the un-caged plots nearby the experimental plots. For the experimentation, they were then transferred into the experimental plots and allowed to fed inside the caged cabbage plants. The insect pests were also counted at the end of the experiment. While doing so, the active insects were counted. The effectiveness of plant materials was assessed in the percentage leaf damage in the scale of 1-5 in the descending order. Recorded parameters were analysed using MSTAT-C software package.

Result and Discussion

The summary of recorded observations with related statistical parameters are presented in Table 1.

Table 1. Efficacy of Bakaino (Melia. azedarach) to the cabbage aphid (Brevicorynae brassicae) in Gaighat, Tanahun, during the winter of 2001/2002 (Mean of three replications)

Treatment number	Treatments	Number of insect released / plant	Number of dead insect/plant	Percent leaf damage (1-5 scale)	Marketable yield t/ha
01	1:5, 5 days	50	21	1.63	7.51
02	1:5, 10 days	50	19	1.58	7.66
03	1:10, 5 days	50	17	1.43	7.90
04	1:10,10 days	50	25	2.75	7.33
05	Control	50	22	2.53	3.43

Percent leaf damage and marketable yield

This parameter was found to be insignificant among the treatments (P= >0.01). However, less insect abundance was found in the treatments 1 through 3 compared to more diluted crude materials and water spraying.

Similarly, the control plot resulted very low marketable head yield compared to the treated plots. The observation for this parameter was found significantly different (P=<0.05) among the treatments. However, there is no correlation observed with the percent leaf damage with that of total marketable yield as shown in the treatments four. The results has indicated for further verification of the experiment taking different types of insect pests

Conclusion

In general, Bakaino (Melia azedarach) posses growth inhibitors to the sucking types of insect however, higher or lesser extent. All the treatments resulted some sorts of effect for the normal development of the aphid however, more concentrated crude plant material spraying in short duration showed promising effect. Bakaino (Melia azedarach) was identified as the good indigenous plant materials having pesticidal properties under field condition. With the use of such materials, the insect nymphs and adults however, may not be killed instantly as insecticide does but their normal development could be hindered. This could be one the reasons for the better yield. This experiment has indicated the possibility of using plant materials against the sucking types of insect pests. And also, has shown the promise for a suitable component of the organic pest management.

Acknowledgement

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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON THE GROWTH AND YIELD OF FINGER MILLET
(Eleusine coracana)

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ABSTRACT : Field experiment was carried out at the experimental farm of Annamalai University, Annamalai Nagar, during summer (February - May 2001) season to study the effect of integrated nutrient management practices on crop nutrient uptake and yield of finger millet (Eleusine coracana) cv CO13. The experiment was laid out in randomised block design with three replication. There are twelve treatments. Among the treatments, T12 recommended NPK along with vermicompost, dual inoculation of Azospirillum and Phosphobacteria and foliar application of chelated zinc (chelamin) registered the highest growth components and yield and yield attributes. The results revealed that integrated use of in organic fertilizers with vermicompost, biofertilizer and foliar application of chelated zinc resulted in an additional beneficial effect over the sole application of inorganic fertilizers. Like N, P and K by enhancing the growth and yield of finger millet. In general, treatment (T12) registered the highest grain and straw yields. It substantially improved the post harvest available nitrogen, phosphorus, potassium and zinc status of the soil.

Key words : Finger millet, Nutrient management, Biofertilizers, soil application and vermicompost.

INTRODUCTION

Finger millet (Eleusine coracana Gaertn), is one of the important millet crops of Tamil Nadu. It is commonly known as ragi or madua in India. It is good for patients suffering from diabetes. The green straw is suitable for making silage. As ragi requires less amount of water and withstand aberrations of weather. It hold a good promise as an alternative to pulse or cotton. The average yield of finger millet is 1417 kg ha-1 in Tamil Nadu and 1080 kg ha-1 in India which is for below than yield of other cereals. One of the main reasons for low production is that, ragi has all along been regarded as "the crop of marginal areas and crop of the poor farmers" with little promotional efforts by farmers and government agencies and injudicious use of plant nutrients. Therefore, there is a vast scope and need for increasing the yield of finger millet. Efforts are to be made to enhance the yield levels by adopting integrated nutrient management technologies involving organic and inorganic sources of nutrients, bio fertilizers, vermi compost. A holistic strategy for promoting integrated nutrient management has become necessary, because of the crucial role of inorganic, organic, biofertilizer, vermi compost and foliar application of nutrients in sustaining soil productivity and ensuring foo security in the wake of deepening energy crises. This calls for balanced use of fertilizers and adoption of integrated nutrient management practices. In view of the escalating prices and high demand-supply gap of chemical fertilizers, there is a strong need to adopt integrated nutrient supply system by judicious combination of organic manaures, inorganic fertilizers, biofertilizers, vermicompost and foliar application of nutrients to improve soil health and finger millet productivity. In this context, INM holds great promise in meeting the growing nutrient demands of intensive agriculture and maintaining the crop productivity at a fairly high level. Hence the present investigation was taken up to develop an INM package for finger millet.

MATERIALS AND METHODS

A field study was carried out at Annamalai University Experimental Farm, Annamalai Nagar, during February - May (2001) to study the effect of integrated nutrient management practices on the growth and yield of finger millet (ragi) cv CO13. The experiments were laid out in randomized block design with three replications. There are twelve treatments viz. T1-RDF recommended NPK (60 : 30 : 30 kg ha-1), T2 - RDF NPK and FYM @ 12.5 t ha-1, T3 - RDF NPK and vermicompost @ 5 t ha-1, T4 - RDF NPK and Azospirillum @ 2 kg ha-1 ; T5 - RDF NPK with FYM @ 12.5 t ha-1 and Azospirillum @ 2 kg ha-1, T6 - RDF NPK with vermicompost @ 5 t ha-1 and Azospirillum @ 2 kg ha-1, T7 - RDF NPK with dual inculation of Azospirillum @ 2 kg ha-1 and phosphobacteria @ 2 kg ha-1, T8 - RDF NPK with FYM @ 12.5 t ha-1 and dual inoculation of Azospirillum @ 2 kg ha-1 and phosphobacteria @ 2 kg ha-1 T9 - RDF NPK with vermicompost @ 5 t ha-1 and dual inoculation of Azospirillum @ 2 kg ha-1 and phospobacteria @ 2 kg ha-1 T10 - RDF NPK with Azospirillum @ 2 kg ha-1 with chelamin foliar spray @ 0.125% T11 - RDF NPK with dual inoculation of Azospirillum @ 2 kg ha-1 and phosphobacteria @ 2 kg ha-1 and chelamin foliar spray @ 0.125%, T12 - RDF NPK along with vermicompost @ 5 t ha-1 and dual inoculation of Azospirillum and phosphobacteria @ 2 kg ha-1 and chelamin foliar spray @ 0.125%. The soil of the experimental field was clayey loam in texture. The short duration variety of fingermillet cv CO13 was chosen for the study. Eighteen days old seedlings were transplanted @ 2 seedlings hill-1 adopting a spacing of 15 x 15 cm. Need based plant protection manners were given to the crop.

RESULTS AND DISCUSSION

Growth components

The results showed that integrated nutrient management approaches favourably influenced the crop growth components like plant height and crop DMP.

Among the treatments, application of recommended dose of NPK along with vermicompost, dual inoculation of Azospirllum and phosphobacteria and foliar application of chelamin significantly influenced the crop growth characters like plant height and crop DMP. Vermicompost application might have reduced the loss of nitrogen, increased the nutrient content and uptake. This might be the reason for the increased plant height in the present investigation. Similar finding of increased plant height reported by Grappelli et al. (1985). Vermicompost or earthworm casts reported to possess growth regulators particularly cytokinins, auxins and gibberellins, which play an important role in rooting and plant development (Torray, 1976 ; Tomati et al., 1983). The higher growth components in the above treatment may also be attributed to better growth of plants due to enhanced availability of N through N fixation by Azospirillum and enhanced availability of applied P as well as soil through better P mobilization by the effect of phosphobacteria (Table 1).

Yield attributes

Yield attributes were highly influenced by INM techniques. Appliction of RDF NPK along with Vermicompost, Azospirillum, Phosphobacteria and Chelamin foliar spray increased the number grains ear head-1 over the control (T1). The increased yield components can be attributed to the fact of additional nutrients added and beneficial effect of the humus contributed by organic manures (Libunao, 1985). The humus might have improved the physical condition of the soil, making a favourable environment for increased uptake of nutrient elements by the plants and resulting in higher yield components (Cegarra et al., 1989). Application of vermicompost might have facilitated easy availability of essential plant nutrient to crop and there by improved the yield attributes in ragi.

Grain yield

Integrated application of RDF NPK, vermicompost, biofertilizers and chelamin foliar spray registered the highest grain yield in summar' 2001 than other treatments.
The prolonged availability of nutrients during the crop growth period from vermicompost might have enhanced the plant growth yield attributes and finally augmented the grain yield to 3.45 t ha-1. Application of biofertilizers are reported to produce growth promoting substances, anti fungal substances and proliferative beneficial organisms in rhizosphere which in turn facilitate an uniform germination, improving seedling vigour and result in healthy plant stand leading to higher yields (Sudhakar, 1998).

Table 1. Effect of INM on plant height (cm) on 30 DAT and 60 DAT and crop DMP (t ha-1)

Treatments	Plant Height (cm)		
	30 DAT	60 DAT	DMP (t ha-1)
RDF NPK (60, 30 and 30 kg ha-1)	34.23	49.67	2.76
RDF NPK + Farm Yard Manure @ 12.5 t ha-1	36.28	52.23	2.89
RDF NPK + Vermicompost @ 5 t ha-1	38.46	55.86	3.85
RDF NPK + Azospirillum @ 2 kg ha-1 (SA)	36.32	53.19	2.96
RDF NPK + FYM @ 12.5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA)	32.48	57.08	3.98
RDF NPK + Vermicompost @ 5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA)	39.76	60.91	4.84
RDF NPK + Azospirillum @ 2 kg ha-1 + Phosphobacteria @ 2 kg ha-1 (SA)	37.28	57.36	4.96
RDF NPK + FYM @ 12.5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA)	42.64	60.68	5.70
RDF NPK + Vermicompost @ 5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA)	45.87	63.29	6.01
RDF NPK + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA) + Chelamin foliar spray @ 0.125 %	44.12	65.34	5.82
RDF NPK + FYM @ 12.5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA) + Chelamin foliar spray @ 0.125 %	53.59	72.19	6.89
RDF NPK + Vermicompost @ 5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphoteria @ 2 kg ha-1 (SA) + Chelamin foliar spray @ 0.125 %	61.19	81.84	7.16
CD (P = 0.05)	1.69	1.63	0.28

Table 2. Effect of INM on yield attributes and yield of ragi

Treatments	Number of grains ear head-1	Number of fingers ear head-1	Grain yield (t/ha)
RDF NPK (60, 30 and 30 kg ha-1)	1081	6.73	1.05
RDF NPK + Farm Yard Manure @ 12.5 t ha-1	1088	7.09	1.30
RDF NPK + Vermicompost @ 5 t ha-1	1094	7.87	1.67
RDF NPK + Azospirillum @ 2 kg ha-1 (SA)	1089	7.34	1.42
RDF NPK + FYM @ 12.5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA)	1100	8.28	1.92
RDF NPK + Vermicompost @ 5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA)	1107	9.02	2.30
RDF NPK + Azospirillum @ 2 kg ha-1 + Phosphobacteria @ 2 kg ha-1 (SA)	1102	8.60	2.05
RDF NPK + FYM @ 12.5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA)	1112	9.41	2.55
RDF NPK + Vermicompost @ 5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA)	1124	10.15	2.92
RDF NPK + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA) + Chelamin foliar spray @ 0.125 %	1122	9.83	2.80
RDF NPK + FYM @ 12.5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphobacteria @ 2 kg ha-1 (SA) + Chelamin foliar spray @ 0.125 %	1130	10.55	3.17
RDF NPK + Vermicompost @ 5 t ha-1 + Azospirillum @ 2 kg ha-1 (SA) + Phosphoteria @ 2 kg ha-1 (SA) + Chelamin foliar spray @ 0.125 %	1136	10.95	3.42
CD (P = 0.05)	5.92	0.35	0.23

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Sustainable Organic Groundnut- Wheat production technology in drought prone area- Saurashtra, Gujarat, India

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Abstract: Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system." (FAO/WHO Codex Alimentarius Commission, 1999).
Groundnut and wheat are important oilseed and cereal crops in Saurashtra, Gujarat. Because of severe drought faced frequently, excess use of fertilizers, pesticides and brackish /salty water, the productivity of soil has been drastically reduced.
An effort has been made and is on to overcome these problems through a organic production of groundnut in kharif and wheat in Rabi season. To nourish crops, a organic substrate had been prepared using locally available materials viz. Local FYM, indigenous Trichoderma and di-azotrophic phosphate solubilizing endophytic bacteria. This substrate was used @ 3 tones in groundnut and 8 tones in wheat under field condition. Plants were protected through cultural methods, locally isolated bio-agents. It was found that the plant characters and yield of groundnut were increased by 12% over chemically fertilized plants and in wheat increase was more than 20 %. Performance of technology was also promising at farmers level. Large scale trial showed that organic cultivation of groundnut and wheat gave comparable yield to the recommended practices. It was 1825 kg pod and 3850 kg fodder in comparison to normal cultivation (1750 kg pods and 3625 kg fodder) of groundnut while wheat grain yield was 4150 kg and straw 3870 kg /ha in organic cultivation. Input cost was also not much higher in organic production. This is a indication that groundnut and wheat not only can be organically produced even in dry area without damaging productivity of soil but improving bio-activity of soil. This will sustain productivity of soil and farming too for a long. This will lead to farmers for organic production of their crops in drought affected area Saurashtra.

Key words : Groundnut, wheat, sustainable-organic technology, drought prone

Introduction: Farms in Saurastra region are generally small (one to ten acres) and the majority of farmers have less than ten acres. In this vast area many types of farming systems are found. However, on most rainfed farms groundnuts, pearl millet, sorghum, sesame, gram, cow-pea, pigeon-pea, and cotton are grown. Formerly these were cultivated in mixtures but today they are increasingly being grown as pure crops

Farmers use a small amount of farm yard manure (about 1200 kg/acre) once in three/ four years on rainfed land and the same quantity each year on irrigated land. This is supplemented with single super phosphate,

Di-Ammon Phosphate and urea. The use made of phosphorus fertilizers is about one and half time more what it should be. Micronutrients are generally not applied. About 50% of the farms have access to animal traction. Others rely on hiring bullocks for cultural operations during crop season, increasingly, on tractors. Pesticides are mainly used in irrigated agriculture. Over-exploitation of the natural resource base is an all-pervasive phenomenon that keeps the majority of farmers trapped in poverty.

The majority are subsistence farmers. Many of them now find chemical fertilizers too expensive and are shifting to animal manure. But animal manure is not for everybody since not every farmer owns animals. Many are desperate to find ways to improve the fertility of their soils, but they do not know that much of it could come from the every crop residue they burn each year.

Groundnut is a major cash crop in the region and is grown on about 6.79 million hectares with production of 6.86 million tons and productivity is 1046 kg / ha (2001-02) Gujarat"s share is about 25 %. The productivity is 834 kg /ha (2002-03). Groundnuts are usually grown by most of the farmers with limited or no access to irrigation. Groundnut cultivation is favored because the crop is fairly drought resistant, can be readily marketed. Wheat is grown in 25.07 millian hectors and productivity is 2743 kg/ha in India (2000-2001). In Gujarat state it is cultivated on 0.43 million hecters land and produces 0.85 million tones/year with 1967 kg productivity (2002-03). Farmers are fertilizing crop with di-ammonium phosphate and urea. Many are unknowingly use excess dose of only urea which imbalances the level of nutrients.

The combined effects of three factors - erosion, rapid mineralisation of organic matter and continuous groundnut cropping are:

- Loss of waterholding capacity and aggravated susceptibility to water stress, especially during dry spells;
- Increased micro-nutrient deficiencies (Zn, Fe, Bo);
- Extreme susceptibility to fungal diseases;
- Increased presence of inoculum of diseases (stem rot); and
- Increased pest populations.

Fungal diseases such as leaf-spot (early and late), root collar rot and stem rot are on the increase. Mayee and Datar (1988) reported 25 per cent loss in production due stem rot disease. Pests like thrips, Aphids, white grub, leaf-miner and prodenia and some time heliothis are creating problems. As a result groundnut yields continue to decline in the marginal areas while production becomes more risky. At present, even in a year with average rainfall, many farmer just about breaks even with a yield of 600kg/ha. The monsoon fails once in three years and yields fall to a mere 175 kg/ha barely enough to replace the seed sown. Over the years the crop has become a loss making proposition for the resource-poor farmer. Ironically, even though many groundnut farmers are heavily in debt they continue with groundnuts because this is the only crop on which money lenders are ready to advance their expensive loans (at interests of up to 24 % a year).

The geographical area has a historical and traditional background, though made up of different tribes. The area experiences erratic rainfall - usually between 400 - 800 per year. This is mostly irregular, and in many years there is drought, which does not promote good agricultural production

Table : 1 Physical and chemical characteristics of soil:

soil	Medium black calcarious	WHC	47%
Order	Vertisol	CEC	30 Mol P + kg-1
EC	0.3, 1:25 level,dsm-1	FC	34%
pH	8.3	PWP	18%
Sand	47.6 %	BD	1.33
Silt	30.14 %	OC	0.65 %
Clay	20.0%	OM	1.65 %
Available moisture	0.114 cm3/cm3	Total N	0.075 %
Porosity	455	Available N	214.8 kg/ha
Drainage	Well	Available P2O5	60-88 kg/ha
CaCo3	36%	Available K2O	272 kg/ha
WHC	47%		

Materials and Methods:

Various local bacterial isolates were isolated from different places with wide variation in soil characters and named viz; EBB-1,EBM-1,EBJ-1,EBJ-2,EBJ-3,EBJ-4,EBKH-1,EBJ-5 and EBKO-1.They were first tested for nitrogen fixation and phosphate solubilization using Ashby's Mannitol and Pikovskya's medium respectively.

election Of Variety : Among different released and well adapted varieties for cultivation, GG-2 (bunch) and GG -20 were selected as are well adapted in the region. The recommended GW496 (T. aestivum) and GW1 (T. durum) were used in pots and field trial.

Preparation of soil :
Fields were prepared through repeated cultivation by ploughing and harrowing to get good tilth. Just after harvesting wheat crop, fields were ploughed with mold bold plough to burry crop traces and sclerotia of Sclerotium rolfsii causing a severe stem, peg and pod rot in groundnut. After harvesting of groundnut field was twice harrowed and bad s were prepared of the size 20 x 2.7 m.

Mannure application : Well digested FYM was improved by adding Phosphate rock @ 5 % and various isolates @ 10ml / kg and it was applied 100g/pot. Effective local isolate of EBJ-5 (Endophytic diazotrophic bacteria) was selected for large scale trail under field condition and used @ 10ml / kg well digested FYM and phosphate rock @ 5 %. Thus prepared phospho-compost was added in soil @ three tons in groundnut and eight tons for wheat/ hectare and mixed well before sowing.

Selection of seed and Seed Treatment: Well developed, undamaged whole kernels were selected of each variety(GG2 and GG20) for sowing (100kg/ha). Under pot condition broth culture of diazotrophic endophytic bacteria was applied @ 10 ml / kg seed and then seed treatment 5 g / kg seed of improved formulation of bio agents using Pseudomonas fluoresces and Trichoderma harzianum given to groundnut to control pre and post emergence blight and stem rot. Certified seed of GW496 and GW1 was used in pot trial as well as field trial (125kg/ha). Seeds of wheat were treated with various bacterial culture @ 10 ml/kg for pot and field trial.

Sowing : Pots were sown as usual and five plants of groundnut and ten plants of wheat kept per pot. Treated seeds of groundnut were sown in rows having distance of 45 cm by bullock drawn seed drill (Field trial). Wheat was sown in furrow keeping 22.5 cm distance between rows.

Irrigation : Rainfed groundnut crop was irrigated as per requirements during crop season (Field trial). Just after sowing of wheat first irrigation was given and subsequent ten irrigation was applied as required. Pots were regularly kept moist irrigating in alternate day in both crops.

Weeding : Hand weeding and inter-culturing were done twice to keep the groundnut crop free from weeds (Field trial). After one month of sowing of wheat a hand weeding was done. Weeds were removed from pots by hand picking.

Plant Protection:

Managements of Diseases :

Collar rot : A field experiment was conducted to find out the effect of bacterial antagonists alone and in combination with thiram (Table 2) as seed treatments for control of collar rot of groundnut. Susceptible groundnut variety GG-2 was used. The crop was grown with 45 x 10 cm spacing in plots of 5.0 m x 2.7 m. size, each treatment replicated thrice. Aspergillus niger grown in half cooked jowar seed was added in furrow @ 50 g/m before sowing. Seed treatment with antagonists was done by treating the seed with talc base preparation (108 cells/g) of antagonist @ 5.0 g/kg seed. Seeds were treated with thiram @ 3.0 g/kg seed. Antagonists were applied prior to seed treatment with thiram. All recommended agronomical practices were adopted during the crop period .Disease incidence was recorded periodically and pod and haulm yield were recorded at harvest. The data were analyzed statistically using ANOVA.

Stem rot : A field experiment was conducted during 1997-98 at Katharota village and 1998-99 and 2000-2001 at Sargvada village in kharif season. The field previously observed for stem rot incidence was selected. The experiment was laid out in RBD with three replications. The spreading variety GAUG-11 was sown in plot of 5.0 x 5.4 m. size. The Trichoderma harzianum–II was grown on mixture of neem cake and wheat husk (3:1) for 25 days. This culture was mixed in talc and soluble starch (1:1) @ to get approximately 106 cfu /g in the formulation.

This formulation was added @ 5.0 g /kg of soil amendments mixed well and applied in furrow before sowing of the crop.

The soil amendments included viz., farm yard manure, castor, neem, mustard cakes, gobar gas slurry (dried), castor shell and wheat husk were used @ 300 kg/ha. The disease incidence and pod yield were also recorded and data analyzed statistically.

Large scale Trial:

To control seed borne diseases, Trichoderma harzianum and Pseudomonas fluorescens based seed dressing preparation was developed and used @ 5g / kg seed just before sowing in groundnut. There is no need of any seed treatment for wheat as we have no problem of any seed borne diseases. Leaf-spots of groundnut were managed by three spraying of formulation made using our own developed strains of Trichoderma and Streptomyces spp..

Management of Insect pests : Aphids were managed by preserving ladybird beetle. Maize were mixed grown with groundnut to have first attack of aphids where ladybird beetle first infested maize plants and they were naturally shifted to main crop of groundnut. In experimental plots other pest population was less than ETL. Wheat crop had not any post germination pest problems.

Harvesting : Bullock drawn harvester was used for groundnut. Small peat were made allowed to sun dry naturally. After proper drying thresher was used to separate pods from plants. Wheat was harvested by manually and thresher was used to separate grain.

Soil Sample collection : The soil sampling was done by repeated trowel samples drown from the row and mixed into a small bucket from which the composite sample in each plot was drawn. Samples were transported to the laboratory where they were analysed adopting standard procedures for estimation of NPK.

Results and discussion :

Germination and Growth :It was evident that seed treatment with our formulation was very good and gave comparable control of pre and post emergence blight and stem rot with fungicides. Germination of groundnut was cent percent. Growth of seedlings was also better in treated seeds. This may be probably because of many growth promoting substances released by bio agents. The good germination and better growth of wheat was observed in various bacterial seed treatment.

Collar rot:
Perusal of data presented (Table 2) reveal that all treatments were effective for reducing seed and seedling rots. The least disease incidence of 19.10 per cent and the highest seed yield of 1441 kg/ha were recorded in the treatment with thiram and Pseudomonas fluorescens (108cfu/g) 5.0 g/kg seed. Performance of Bacillus–A with thiram was the second best treatment. Similarly haulm yield was also higher in these treatment over check (Table 2). The combination of thiram with antagonist was superior over sole treatment of either antagonist or fungicides.

The seed treatment of P. fluorescens alone was equally effective to the seed treatment with thiram. Parakhia et. al. (1998) obtained good control of collar rot(A. niger) of groundnut with seed treatment of P. fluorescens Shella et. al. (1998) recorded a minimum collar rot (A. niger) incidence (23 %) in carrier based (peat soil, FYM and gobar gas slurry) soil application of P. fluorescens. Podile and Prakash (1996) showed a reduced incidence of A. niger when seeds were bacterized with Bacillus subtilis. Thiram with Bacillus-B, P. fluorescens, thiram and P. fluorescens gave 1302, 1300 and 1287kg/ha pod yield, respectively. However , they were statistically at par.

The Pseudomonas fluorescens (108cfu/g- 5.0 g/kg) may be recommended to control collar rot disease and to improve pod yield of groundnut in calcareous soil of Saurashtra.

Stem rot:

All the soil amendment carriers were found to be effective in reducing the disease and improving the yield except castor shell (Table-3). The least disease incidence was recorded in the treatment of wheat husk, mustard cake, castor cake and farm yard manure carrier based amendments. Maiti and Sen (1985) have reported good control of stem blight of groundnut with Trichoderma harzianum in wheat bran.

Kulkarni et. al. (1994) noted that soil drenching and seed treatment of T. harzianum were effective against stem rot of groundnut. Seed treatment with T. harzianum gave good control of collar or root rot (Sclerotium rolfsii) of sunflower (Prasad et al., 1999; Mesta and Amaresh, 2000). The castor shell was very poor in performance in present study.The maximum pod yield of 1317 kg/ha was recorded in the treatment of wheat husk followed by mustard cake (1272 kg/ha), FYM (1248 kg/ha) and castor cake (1216 kg /ha) (Table-3). Similarly all the treatments have increased haulm yield over check (Table-3).
Therefore it is suggested to mix Trichoderma harzianum-II (106 cfu/g) @ 1.5 kg/ha in 300 kg of farm yard manure and apply just before sowing in furrow to control stem rot and to improve pod yield in groundnut crop.

Leaf spots

The results presented in table showed that all the treatment found effective in controlling leaf spots disease of groundnut compared to control. The maximum control of disease (13.70%) was recorded in foliar application of carbendazim followed by propiconazole. The pod yield of groundnut also higher in both the treatment as compared to rest of treatment. The response of bio-control agents as compared to chemical treatments was inferior but found promising in reducing disease and to improve the pod yield of groundnut. The additive effect was observed when they were used in combination. Based on the results, formulation of Trichoderma and Actinomycetes(Streptomyces) was used to control diseases under field condition.

Plant height and yield

Plant Character :Plant height was improved by all bacterial isolate except EBKH-1 bacteria of GG- 2. Bacterial isolate EBJ-2 treated plants had 30.35cm height which was quite comparable to the dose of chemical fertilizers. This is followed by EBM-1and EBKO-1. Fodder yield was highest in the treatment of chemical fertilizers ie 20.05 g /pot followed by EBKO-1and EBJ-5. Least haulm yield was recorded in control (without any application). It is interesting to note that EBJ-5 gave maximum yield indicating best partitioning ratio ie photosynthetic and pod yield. Other isolates were also performed well in comparison to control treatments (Table 5)

Ground var. GG20 responded differently to various bacterial isolates.Plants attained height of 33.5 cm. Where EBJ-5 was used followed by EBJ-1. Maximum fodder yield (23.68 g/pot) was recorded in the treatment of EBJ-5 followed by chemical fertilizers.Maximum pod yield (19.83 g /pot) obtained where EBJ-5 was used followed by EBM-1. Least plant height, haulm and pod yield recorded in control (Table 6).

Effect of diazotrophic and phosphate solubilising endophytic bacterial isolates were evaluated for organic wheat production in both types ie. Durum and aestivum. EBJ-3 and EBJ-5 are found equally effective as chemical fertilizers to increase height of plants of durum var. GW1and GW 496 (aestivum). Grain and straw yield were improved under the treatment EBJ-5 in both cases. T. aestivum plants responded variously but EBJ-5 gave maximum height (56.45 cm.) and grain yield (17.04 g / pot). How ever EBJ-2 gave maximum straw yield (15.71 g / pot) followed by EBM-1 (14.98 g/pot) but grain yield was less than EBJ-5 and it was more than application of chemical fertilizers(Table 7 &8). Parakhia et al, (2000), observed only seed inoculation of Azotobacter can full fill the 50 % nutrient requirement of Groundnut . Wani(1990) has also reported good response of associative nitrogen fixing bacteria in cereal crops.

N, P&K

Available nitrogeg was increased after groundnut cultivation in all treatments. Bacterial cultures and Phospho-compost were quite effective to maintain N level. This may probably due additive effect of seed treatment of diazotrophic endophytic bacteria, effective nitrogen fixation through native Rhizobium and high N content of Phospho-compost. Nitrogen level was slightly reduced after wheat crop but it was again not only maintained but also increased after second crop of groundnut (2003-04). After second season of wheat (2003-04) though N content was slightly reduced but it was more than initial level.(Table 9 & 10).

Phospho-compost and seed application of diazotrophic endophytic bacteria were able to solubilise phosphorus from phosphate rock and soil. During first year (2002-03) bacteria EBJ-5 ,EBJ-2and EBJ-1 with their respective phospho-compost had 114,103 and 98 kg/ha available phosphorus after groundnut var GG-20 and 99, 97 and 91 after wheat GW 496. Level of phosphorus was maintained without depletion during second year cropping(Table 11). Same trend was observed in case bunch variety GG-2 of groundnut and durum wheat var. GW-1(Table12). Potassium level was also maintained after two season cultivation of groundnut and wheat in both the cases (Table 13 &14).

Indian researchers show that Azotobacter was beneficial for several crops and its use as Biofertilizers increase the yield by 0-25 % over the control without any amendments and by 8-15 % when FYM was used.

Azotobacter when used as a Biofertilizers also showed the decrease in disease intensity in mustard crops (Hassouna.and Wareing 1964; Narula et al,1993; Pandey and Kumar 1991) and Downey mildew in opium poppy crop (Narula et al,1993., Sunja, et al.1994) due to damage by shoot fly infection. Most of the experiments conducted with pear millet showed 30.6% increase in yield . The reasons for increase in yield were however attributed more to growth promoting substances which helped the plants for nitrogen assimilation.

Phospho-compost prepared by mixing by farm waste, cattle dung and soil has found to be as good as single super phosphate(SSP) (Bangar et al., 1995; Palaniappan and natarajan,1993). At pH value higher than 7.5, where directly applied phosphate Rock is not expected to dissolve, phospho-compost as effective as SSP (Misra and Bangar, 1986). Garge (1998) has used strain of Azotobacter chroococcum in fish pond, which could solubilize phosphate.Parent isolate of A. chroococcum solubilize TCP (2 %) was from 0.6585-1.526 μg/ml and with MRP (1%) it was from 0.1442 - 0.1973 μg/ml and mutant isolate with TCP were from 0.5862 to 1.776 μg/ml with MRP were from 0.1602 - 0.2297 μg/ml. (Kumar, 1998)

It is evident from the data presented in Table 15 that the practices used to produce organic groundnut and wheat gave comparable yield of both the crops as against chemical crop production. It was 1825 kg pod and 3850 kg fodder in comparison to normal cultivation (1750 kg pods and 3625 kg fodder) of groundnut while wheat grain yield was 4150 kg and straw 3870 kg /ha in organic This will lead to farmers for organic production of their crops in drought affected area Saurashtra.

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Table 2: Effect of seed treatment with antagonists and thiram on incidence of collar rot and yield of pod and haulm in groundnut (pooled of four years i.e.1997-98 to 1999-2001).

Treatment	Disease incidence (%)	Pod yield (kg/ha)	Haulm yield(kg/ha)
Bacillus-A	26.31 (30.88)	1160	2548
Bacillus-B	26.41 (30.93)	1125	2572
Bacillus-D	28.40 (32.21)	1127	2490
P. fluorescens	23.88 (29.26)	1287	2518
Thiram + Bacillus-A	22.67 (28.42)	1394	2644
Thiram + Bacillus-B	24.52 (29.70)	1302	2738
Thiram + Bacillus-D	26.35 (30.89)	1235	2599
Thiram + P. fluorescens	19.10 (25.93)	1441	2719
Thiram	23.88 (28.82)	1300	2586
Control	33.20 (25.19)	1014	2217
CD at 5 %	(01.76)	89	111
CV %	(07.60)	9.33	7.51

Table 3: Effect of Trichoderma harzianum-II mixed with soil amendments on stem rot incidence and yield of pod and haulm in groundnut(pooled of four years i.e.1997-98 to 1999-2001).

Treatment	Disease incidence (%)	Pod yield (kg/ha)	Haulm yield(kg/ha)
F.Y.M.	21.90 (27.90)	1248	2627
Castor cake	20.89 (27.19)	1216	2628
Neem cake	27.30 (31.50)	1050	2399
Mustard cake	20.40 (26.85)	1272	2612
Gobar gas slurry(Dried)	24.37 (29.58)	1163	2482
Castor shell	30.32 (33.41)	992	2356
Wheat husk	19.65 (26.31)	1317	2708
Control	34.88 (36.20)	951	2107
C. D. at 5%	(01.02)	80	74
C. V. %	(05.90)	8.1	7.47

Table 4: Effect of Trichoderma and Actinomycetes (Streptomyces spp.) on Cercospora leaf spots disease and pod of (groundnut. Field Trail 2002-2003)

Treatment	Quantity	Disease intensity (%)	Pod yield (kg/ha)
Trichoderma harzianum ,cfu 106	5g/l	37.20 (37.57)	1446
Actinomyces, cfu 108	5 g/l	31.40 (34.07)	1440
Trichoderma harzianum + Actinomyces	5 g/l	22.82 (28.56)	1560
Carbendizm 50 wp	1 g/l	13.70 (21.73)	1845
Mancozeb 75%wp	2.5 g/l	20.21 (26.71)	1645
Propiconazole25EC	1.0 m	15.90 (23.56)	1696
Control		48.62 (44.23)	1294
C.D. at 5%		(3.62)	281
C.V. %		(7.90)	12.15

Data given in parenthesis are transformed value

Table 5: Effect of Phospho-compost and seed treatment of diazotrophic endophytic bacterial isolates on growth and yield of groundnut (bunch) var. GG-2 (Pot Trial)

Treatment	Height (cm)			Fodder yield g/pot			Pod yield g/pot		
	2002-03	2003-04	Mean	2002-03	2003-04	Mean	2002-03	2003-04	Mean
EBB-1	25.87	24.75	25.31	19.0	8.00	13.5	16.5	4.25	10.38
EBM-1	24.75	34.25	29.5	20.0	13.00	16.5	24.0	6.87	15.44
EBJ-1	21.85	28.75	25.3	18.1	9.50	13.8	17.5	5.50	11.5
EBJ-2	22.95	37.75	30.35	21.5	8.75	15.13	17.0	4.62	10.81
EBJ-3	21.62	32.50	27.06	16.6	12.12	14.36	21.6	6.00	13.8
EBJ-4	23.32	33.00	28.16	15.0	10.62	12.81	21.2	5.37	13.39
EBKH-1	21.30	31.25	26.28	20.5	7.75	14.13	19.5	4.75	12.13
EBJ-5	23.10	33.00	28.05	19.5	12.37	15.94	25.5	6.87	16.19
EBKO-1	24.00	29.75	26.88	24.0	10.62	17.31	19.0	5.50	12.25
RD Fert	25.32	33.00	29.16	30.6	9.50	20.05	24.4	6.00	15.2
Control	21.62	23.25	22.44	16.5	7.75	12.13	14.1	3.62	8.86

Table 6: Effect of Phosphocompost and seed treatment of diazotrophic endophytic bacterial isolates on growth and yield of groundnut (semi spreading) var. GG-20 (Pot Trial)

Treatment	Height (cm)			Fodder yield g/pot			Pod yield g/pot		
	2002-03	2003-04	Mean	2002-03	2003-04	Mean	2002-03	2003-04	Mean
EBB-1	30.00	32.00	31.0	17.43	19.62	18.53	19.12	6.62	12.87
EBM-1	30.20	33.25	31.73	20.12	21.25	20.69	28.20	9.50	18.85
EBJ-1	34.48	32.25	33.37	23.85	19.75	21.8	27.20	7.00	17.1
EBJ-2	28.80	31.50	30.15	19.25	18.25	18.75	17.00	7.00	12.5
EBJ-3	33.00	32.00	32.5	22.44	19.62	21.03	23.23	8.87	16.05
EBJ-4	31.75	33.25	32.5	18.85	19.25	19.05	19.35	7.75	13.55
EBKH-1	31.00	31.50	31.25	19.72	21.12	20.42	24.50	7.50	16.0
EBJ-5	34.50	32.50	33.50	25.10	22.25	23.68	29.65	10.00	19.83
EBKO-1	30.35	31.75	31.05	17.62	18.25	17.94	22.68	6.87	14.77
RD Fert	32.00	33.50	32.75	20.20	22.25	21.23	26.35	9.25	17.8
Control	28.20	30.50	29.35	18.00	16.20	17.1	16.12	5.62	10.87

Table 7: Effect Effect of Phosphocompost and seed treatment of diazotrophic endophytic bacterial isolates on growth and yield of wheat (Duram) var. GW-1

Treatment	Height (cm)			Straw yield g/pot			Grain yield g/pot		
	2002-03	2003-04	Mean	2002-03	2003-04	Mean	2002-03	2003-04	Mean
EBB-1	30.35	52.32	41.34	3.8	19.75	11.78	3.9	9.5	6.7
EBM-1	29.80	54.19	41.06	3.6	19.50	11.55	4.0	9.0	6.5
EBJ-1	27.82	55.38	41.6	3.3	13.37	8.34	3.4	8.75	6.08
EBJ-2	30.30	58.81	44.56	3.7	19.21	11.46	4.5	10.5	7.5
EBJ-3	33.37	62.42	47.90	4.8	17.25	11.03	5.0	9.25	7.13
EBJ-4	30.38	61.68	46.03	3.5	17.12	10.31	5.3	9.12	7.21
EBKH-1	32.00	58.42	45.21	3.6	17.87	10.74	5.1	9.00	7.05
EBJ-5	34.55	61.16	47.86	3.7	21.37	12.54	5.9	11.37	8.64
EBKO-1	28.49	53.30	40.90	3.1	20.00	11.55	3.9	7.87	5.89
RD Fert	32.81	62.91	47.86	3.7	23.12	13.41	3.8	9.37	6.59
Control	27.85	50.83	39.34	2.4	18.00	10.2	3.8	7.37	5.59

Table 8: Effect of Phosphocompost and seed treatment of diazotrophic endophytic bacterial isolates on growth and yield of wheat (aestivum) var. GW-496 (Pot trial)

Treatment	Height (cm)			Straw yield g/pot			Grain yield g/pot		
	2002-03	2003-04	Mean	2002-03	2003-04	Mean	2002-03	2003-04	Mean
EBB-1	45.49	55.47	50.48	9.8	17.75	12.78	10.0	17.25	13.63
EBM-1	42.75	58.02	50.30	8.6	21.37	12.98	9.10	19.62	14.36
EBJ-1	44.97	59.12	52.04	9.2	17.62	13.61	9.10	17.87	13.49
EBJ-2	46.02	61.31	53.67	9.8	21.62	15.71	11.10	20.25	15.68
EBJ-3	44.07	59.85	51.96	7.2	18.12	12.66	9.80	17.75	13.78
EBJ-4	44.74	66.73	55.74	5.3	21.12	13.21	8.20	19.50	13.85
EBKH-1	45.12	62.97	54.05	6.3	22.00	14.15	9.40	19.12	14.26
EBJ-5	47.60	65.30	56.45	8.0	21.75	14.88	11.70	22.37	17.04
EBKO-1	44.97	52.83	48.90	5.9	15.62	10.76	6.20	14.87	10.54
RD Fert	46.46	61.31	53.89	7.8	19.50	13.05	9.10	19.00	14.05
Control	39.72	52.47	46.09	4.4	15.50	9.95	5.80	14.12	9.96

Table 9: Effect of Phospho-compost and seed treatment of diazotrophic endophytic bacterial isolates on nitrogen status of soil of groundnut var GG-2 and wheat GW-1 crop sequence

Treatment	Available Nitrogen kg /ha. after harvesting of crop			
	2002-2003		2003-2004	
	Groundnut GG-2	Wheat-GW-1	Groundnut GG-2	Wheat-GW-1
EBB-1	229	221	313	274
EBM-1	289	242	376	281
EBJ-1	279	231	329	264
EBJ-2	263	251	332	254
EBJ-3	288	271	332	258
EBJ-4	272	226	317	249
EBKH-1	273	254	363	275
EBJ-5	260	279	392	291
EBKO-1	241	233	301	248
RD Fert	257	239	319	238
Control	233	209	164	135

Initial available nitrogen 215 kg/ha

Table 10: Effect of Phospho-compost and seed treatment of diazotrophic endophytic bacterial isolates on nitrogen status of soil of groundnut var GG-20 and wheat GW-496 crop sequence

Treatment	Available Nitrogen kg /ha after harvesting of crop			
	2002-2003		2003-2004	
	Groundnut GG-20	Wheat-GW-496	Groundnut GG-20	Wheat-GW-496
EBB-1	336	245	356	290
EBM-1	319	279	304	269
EBJ-1	323	229	351	280
EBJ-2	298	235	319	269
EBJ-3	258	275	335	270
EBJ-4	286	223	323	274
EBKH-1	248	254	305	264
EBJ-5	357	295	369	310
EBKO-1	258	258	276	247
RD Fert	223	260	294	244
Control	185	129	148	120

Initial available nitrogen 215 kg/ha

Table 11: Effect of Phospho-compost and seed treatment of diazotrophic endophytic bacterial isolates on phosphorus status of soil of groundnut var GG-2 and wheat GW-1 crop sequence

Treatment	Available phosphorus kg /ha after harvesting of crop			
	2002-2003		2003-2004	
	Groundnut GG-2	Wheat-GW-1	Groundnut GG-2	Wheat-GW-1
EBB-1	85	81	86	79
EBM-1	89	83	91	69
EBJ-1	95	94	100	81
EBJ-2	100	90	110	86
EBJ-3	86	80	89	77
EBJ-4	94	86	103	92
EBKH-1	89	76	95	85
EBJ-5	110	96	117	98
EBKO-1	92	84	95	86
RD Fert	80	85	97	87
Control	70	67	72	63

Initial level of phosphorus 86 kg /ha

Table 12: Effect of Phospho-compost and seed treatment of diazotrophic endophytic bacterial isolates on phosphorus status of soil of groundnut var GG-20and wheat GW-496 crop sequence

Treatment	Available phosphorus kg /ha after harvesting of crop			
	2002-2003		2003-2004	
	Groundnut GG-20	Wheat-GW-496	Groundnut GG-20	Wheat-GW-496
EBB-1	87	82	86	83
EBM-1	92	83	90	81
EBJ-1	98	91	100	86
EBJ-2	103	97	106	96
EBJ-3	85	78	88	79
EBJ-4	93	88	103	92
EBKH-1	95	86	97	83
EBJ-5	114	99	121	112
EBKO-1	92	87	98	82
RD Fert	86	83	96	80
Control	76	68	79	64

Initial level of phosphorus 86 kg /ha

Table 13: Effect of Phospho-compost and seed treatment of diazotrophic endophytic bacterial isolates on potassium status of soil of groundnut var GG-2 and wheat GW-1 crop sequence

Treatment	After harvesting of crop			
	2002-2003		2003-2004	
	Groundnut GG-2	Wheat-GW-1	Groundnut GG-2	Wheat-GW-1
EBB-1	290	266	285	275
EBM-1	288	263	293	288
EBJ-1	292	263	297	283
EBJ-2	296	274	286	276
EBJ-3	278	257	268	259
EBJ-4	286	262	276	262
EBKH-1	267	248	262	251
EBJ-5	309	296	302	293
EBKO-1	279	253	263	251
RD Fert	280	251	272	252
Control	259	220	209	194

Initial level of potassium 280 kg /ha

Table 14: Effect of Phosphocompost and seed treatment of endophytic bacterial isolates on potash status of soil of groundnut var GG-20 and wheat GW-496 crop sequence

Treatment	After harvesting of crop			
	2002-2003		2003-2004	
	Groundnut GG-20	Wheat-GW-496	Groundnut GG-20	Wheat-GW-496
EBB-1	300	276	289	279
EBM-1	297	269	296	283
EBJ-1	289	273	293	287
EBJ-2	298	279	291	280
EBJ-3	288	277	282	269
EBJ-4	304	282	298	286
EBKH-1	287	273	288	271
EBJ-5	326	314	319	311
EBKO-1	278	264	281	274
RD Ferti.	289	271	282	273
Control	261	248	246	239

Initial level of potassium 280 kg /ha

Table: 15 Field response of various practices for organic groundnut and wheat production (2003-2004).

Practices	Groundnut	
	Organically managed plot	Chemically managed plot
Gemination	94 %	91 %
Seedling rot	12 %	8 %
Thrips	Below ETL	Below ETL
Flowering	27 days	28 days
Leaf spots	16 %	10 %
Rust	Not observed	Not observed
Stem rot	8 %	12 %
Duratiopn of crop	120 days	117 days
Yield Pods	1825 kg /ha	1750 kg /ha
Fodder	3850 kg /ha	3625 kg /ha
	Wheat	
Germination	93 %	90 %
Plan height	95 cm	93 cm
Duration	120 days	118 days

Yield	Grain	4150kg / ha	4525 kg/ha
	Straw	3870 kg /ha	4125 kg /ha

Incidence of Shot Hole Borer (*Xyleborus fornicatus* Eichhoff) damage in Tea as Influenced by Organic and Conventional Crop Management Systems

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Abstract : Organic tea cultivation has been reported to as a sustainable agricultural practice with greater environmental, economic and social benefits. However, pest management under organic cultivation is not adequately studied except for plant parasitic nematodes.
In this paper, we report evidences on the incidence of shot-hole borer damage in tea monitored in the long term experimental plots of Organic and Conventional Comparison (TRI ORCON) Trial set up at the Tea Research Institute of Sri Lanka.
In the second pruning cycle, tea bushes grown organically showed significantly (p=0.05) lower SHB infestation compared to that of in conventional treatment. Neem Oil Cake and Tea Waste showed their pesticidal effects but Compost treatment has failed to bring down SHB infestation through out. Neem Oil Cake did not encourage colony forming of the ambrosia fungus.
Overall, data elucidate that organically grown tea exhibits lower incidence of Shot-hole borer while sustaining comparable crop yields. However, further experimentation on attribtes of sugar contents in phloem sap associated with Ambrosia fungal growth, healing capacity and various volatile chemicals in shot-hole borer affected branches and biological phenomena in organically and conventionally grown tea is in progress in order to validate the behavior of the Shot-hole borer beetle.

Introduction

Among pests in tea lands, the Shot-hole borer (SHB) beetle, *Xyleborus fornicatus* Eichhoff (Coleoptera: Scolytidae) was classed as the most serious insect pest of tea in Assam and Sri Lanka since 1892 (Austin, 1956). It is now distributed in India, Burma, Indo-China, Formosa, Malaya, Indonesia, Philippines and New Guinea and in all tea districts in Sri Lanka and considered as economically important.

Shot-hole borers are small, wood-boring beetles, also called 'ambrosia beetles' because of the larvae fed on the ambrosia fungus, *Monacrosporium ambrosium* (Gadd, 1947). Female beetles construct galleries in the stem leading to branch breakage, wood-rot and die back. Die back and branch breakage facilitate the entry of wood-rotting organisms through the dead plant cells. Accumulation of wood rot in frames lead to the long-term debilitation and the premature death of bushes (Sivapalan and Delucchi, 1975).

The whole concept of organic tea production is aimed at achieving an overall production management system which promotes environmentally, socially and economically sound method while maintaining recycling of natural resources, bio diversity, non use of synthetic inputs, premium price, social acceptability, and fair trade incentives etc. But one of the major constraints in maintaining high productivity in tea industry is considered common pests and disease problems.

However, Mohotti et al. (2001) reported the potentials of natural management of tea pests under organic cultivation techniques compared to that of under conventional chemical agriculture. Attributes and possible nematode suppressiveness in organically maintained tea lands have been well described (Mohotti et al., 1999 and 2000).

Selvasundaram et al. (2001), Sivapalan (1985) and Vitarana (2002) summarized the general strategies for management of the shot-hole borer in tea. Some of them include measures for maintaining bush vigor by adopting proper field management practices; in all means, organic agriculture principles do assure a healthy plant.

Detailed information on pest and disease incidence except for nematodes on organically and conventionally grown tea is very scares. Therefore, the present study was undertaken with the objective of evaluating the Shot-hole borer infestation in tea in relation to long exposure of organic management practices. The parameters of the pest incidence were compared with the conventional system of tea cultivation.

Materials and Methods

The samples were drawn from the tea plants of the cultivar DT1 established in 1996 in the 'TRI ORCON' long term comparison trial set up at the Tea Research Institute (TRI), Talawakelle, Sri Lanka. Since planting, three organic systems received soil organic amendments of Tea Waste, Neem Oil Cake and Compost fortified with general and pest and disease management practices according to the IFOAM guidelines. The conventional trial plots were maintained with TRI recommended synthetic fertilizers and agro-chemicals. The experimental plots are designed in a randomized complete block design with four replicates. The location is a SHB prone area.

Levels of Shot-hole borer infestation in different treatments were determined just prior to first (year 2000) and second prune (year 2004). Stem samples were taken randomly from bushes all over the plot: 50 stem units from 50 different bushes (The selection of branches were at random basis and no attempt was made to select only those showing signs of SHB galleries). The sample unit was 30 cm in length and 1 cm in diameter (brown streaky stem of pencil thickness) stem piece. Each sample unit was split opened in the laboratory and the number showing any galleries in the wood was counted.

Galleried stem pieces which were occupied with developing brood of SHB were collected. Galleried stem portions were separated from the rest to determine the growth of ambrosia fungus, *Monacrosporium ambrosium* inside the borer galleries of stems in both under organic and conventional crop management systems. After removing the bark, separated galleried stem pieces were ground and prepared a spore suspension by homogenizing 1g of ground stem in 10 ml sterilized distilled water. Ten fold serial dilutions of spore suspensions were prepared. Fifteen milliliters (15ml) each of potato dextrose agar medium (amended with streptomycin) was poured in to 90 mm diameter petri plate and inoculated with 1ml of spore suspension with three replicates from each dilution. The resulting colony forming units (cfu) were determined after 48 hrs of incubation at 27^0C.

Results and Discussion

Results of SHB infestation just prior to first (Table 1) and second (Table 2) pruning under different organic and conventional management systems are presented. Non significant data on SHB were observed in the first prune while at the second prune the data were statistically significant. The tea bushes grown organically showed significantly (p=0.05) lower SHB infestation compared to that of in conventional treatment. Lowest SHB incidence was evident in tea maintained organically with Tea waste and Neem Oil Cake amendments. Compost treatment showed the highest SHB damages in stems.

Amarasinghe *et al*. (1999) discussed the role of bark volatile compounds for SHB host-finding and applications for its management. However, the data on the levels of volatile chemicals i. e. T-2-Hexanol, Linalool-o-1, Linalool-o-2, Linalool, MS and Geraniol in SHB infested and unaffected stem barks of tea grown organically and conventionally did not show consistent trends (data not presented).

Table 1 Shot-hole borer infestation just prior to first prune under organic and conventional crop management systems in tea

Treatment		Mean number of total galleries $30cm^{-1}$
Management System	Type of manure	
Organic	Tea Waste	3.075
	Neem Oil Cake	3.000
	Compost	3.775
Conventional		3.475
LSD		2.288

Extracted from Amarasinghe *et al*. (2000)

Neem Oil Cake and Tea Waste treatments showed pesticidal effects by exhibiting low SHB infestations in organically grown tea; the Compost treatment has failed to bring down SHB infestation through out. Significant differences were seen in open and healed galleries of SHB damage in tea bushes (Table 2). However, the healing capacity of tea bushes after constructing galleries inside the tea stem by shot-hole bores were not statistically significant in all organically managed tea bushes; significantly (p=0.05) superior healing capacity was seen in conventional tea growing.
The amount of sugar present in phloem sap of bushes grown organically with different types of organic manures and conventionally did not show significant differences (data not presented). The interaction between sugar content and fungus association in borer galleries under different cultural practices is therefore unclear as yet.

Table 2 Shot-hole borer infestation just prior to second prune under organic and conventional crop management systems in tea

Treatment		Mean number of Galleries $30cm^{-1}$		
Management System	Type of manure	Total	Open	Healed
Organic	Tea Waste	1.89 [b]	0.68 [b]	1.21 [b]
	Neem Oil Cake	1.85 [b]	0.75 [b]	1.08 [b]
	Compost	2.59 [ab]	1.07 [a]	1.52 [ab]
Conventional		3.06 [a]	0.94 [ab]	2.11 [a]
CV		25.28	20.07	31.13

Means with same letters are not significantly different at p<0.05 level.

Ambrosia fungal association inside the borer galleries in stems of tea under organic and conventional cultivation is shown in Table 3.

Table 3 Association of *Ambrosia* fungus inside the borer galleries of tea plants grown under organic and conventional crop management systems

Treatment		Total cfu after 2 days of incubation
Management System	Type of manure	
Organic	Tea Waste	$11.06x10^{4}$ [a]
	Neem Oil Cake	$3.53x10^{4}$ [c]
	Compost	$4.23x10^{4}$ [c]
Conventional		$6.83x10^{4}$ [b]
CV		20.65

Means with same letters are not significantly different at p<0.05 level.

The Neem Oil Cake treatment does not seem to encourage the *Ambrosia* fungus. Also, it has lead to lowest shot-hole borer infestation. Tea Waste treatment had highest cfu but the SHB infestation was comparatively less. Therefore, the results of the present study are inadequate to justify any correlation with the *Ambrosia* fungus and SHB incidence.

According to the results of the present study, organically maintained tea bushes were initially subjected to high incidence of SHB damage compared to that of Conventional treatment. However, continuous adoption of proper organic farming practices has given rise to reduce the SHB damage in tea. Also, the shoot and root establishment and growth of organically grown tea under field conditions were superior to conventionally grown tea (Mohotti *et al*., 1998, 2001 and 2003). The yields of organically and conventionally grown tea in the first and second pruning cycles were also comparable and non significant (Mohotti *et al*., 2001). This indicates that the organic tea production system can be considered as a sustainable method of cultivation in terms of productivity and pest management.

As per Mohotti *et al*. (1998, 1999 and 2000), similar trends in nematode suppressiveness have been evident in both organic soils of the TRI ORCON trial plots as well as in organic tea soils in different localities in the country. However, varying levels of SHB infestations were noticed in organic tea estates in the different localities. The age, cultivar, management differences and elevation etc. were not monitored in evaluations that would have been the reasons for the inconsistent data. Close monitoring of data is therefore envisaged for better understanding of the scenario.

Mohotti *et al*. (1998, 1999 and 2000) specified the improved health of organically maintained tea soils enriched with beneficial organisms as compared to conventional tea soils. Stoll (2000) discussed the role of well formulated and balanced manure and a healthy organic soil contribute to a strong resistance against diseases and insects. Also, the practice of incorporation of organic amendments into soil not only as crucial in achieving increased yields but also one of the few effective ways of reducing damage from insect pests. Therefore, the research evidence gathered in this study is in agreement with Mohotti *et al*. (1998, 1999 and 2000), Reganold *et al*. (2001) and Stoll (2000). However, further work is required to justify the role of plant characters induced due to long term exposure of organic agricultural practices as well as the factors which promote SHB infestation under conventional farming systems in tea. These information would be beneficial in management of SHB under any farming condition.

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New: PAN Germany's „**Online information service for non-chemical pest management in the tropics, OISAT *Info***"

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Poster Title: Wise Use of Water Hyacinth as Hydrophonics for Sustainable Livelihood

Description of activities:
The people of rural Bangladesh have developed different farming systems and techniques through generations of innovation and adoption, which have been fine-tuned to the local environment, economy and sociocultural system. It is reveals that people of the floodplains have a rich store of local knowledge and associated practices.

During monsoon the low-lying area of Bangladesh get inundated for six months and often the farmers have no option but to wait for next cultivation until recession of floodwater. This makes their livelihood vulnerable. But farmer's ingenuity and indigenous knowledge has made up another means of livelihood system. Under the aforesaid situation, farmers prepare floats normally with the help of water hyacinth, clay soil and aquatic weed. Straw or other plant debris are spread in between the stocks for travelling the float. They spread soil mixed with cowdung or compost over the float at a thickness of about 6 inches. They sow vegetable seeds on this floating seedbed. All necessary cares of the seedbed are taken from another float which can move freely around the floating seedbed.

The practice helps farmers overcome the serious shortage of vegetables in the market that normally occurs immediately after high flood. The practice also provides source of earning through selling of excess vegetables in the markets.

Objectives:
The attempt of this poster is to contribute a conceptual understanding of floodplain production systems and livelihood strategies set in the context of the land / water interface ecosystem. It will also give an impression on -- how do farmer's innovations and indigenous knowledge relate with the process of development of eco-farming.

Concluding Remarks:
Increasing environmental and technical level concerns required alternative ways of producing crop. Attempts among the growers, researchers as well as consumers on low input, ecological and organic systems of growing crop have evolved as means of eliminating such risks in many countries as well as is Bangladesh also.

Over the centuries, Bangladeshi farmers develop valuable systems of traditional knowledge of natural resource management for crop production that are intricately connected to the reality of their livelihood systems. People meet their livelihood to the best of their knowledge which, if understood and documented, would bring good result and assist to sound natural resource management. It is, therefore, imperative that indigenous technologies of agriculture need to be identified, documented and disseminated among the farmers. Use of such technologies would like to reverse the trend of deteriorating natural resources of the country as well as elsewhere.