National Workshop

Disappearing non-GM cotton – ways forward to maintain diversity, increase availability and ensure quality of non-GM cotton seed

Proceedings

University of Agricultural Sciences Dharwad (UASD)

Dharwad, Karnataka

21 June 2011

Edited by
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Organised by

Research Institute of Organic Agriculture (FiBL), Frick, Switzerland

bioRe India (Ltd), District Khargone, Madhya Pradesh, India

University of Agricultural Sciences Dharwad (UAS Dharwad), Dharwad, Karnataka, India

Supported by

Chetna Organic, Tarnaka, Hyderabad, India

Textile Exchange, Chennai, India

Content

1 Invitation

National Workshop on:

Disappearing non-GM cotton – ways forward to maintain diversity, increase availability and ensure quality of non-GM cotton seed

Synopsis

In the last years, India has become the largest organic cotton producer worldwide with an increasing number of organic cotton projects throughout the country. Conversely in 2010, more than 80% of India's cotton area is grown with genetically modified Bt-cotton. Since the private and the public sector have withdrawn from the production of non-GM cotton seeds, the supply of non-GM seeds to the remaining 20% of farmers, including organic cotton projects, has become a critical. If no measures are taken to hold this process, the number of years for non-GM cotton seed production is counted. The absolute dominance of GM-cotton production will not only destroy India's organic cotton sector, but will also reduce genetic diversity, which will affect the agro-ecosystem equilibrium in long term.

bioRe and FiBL invite to a two-day workshop on ways forward to maintain diversity, increase availability of appropriate cultivars and ensure high quality of non-GM cotton seed crucial for organic production. In more particular we would like to focus on the challenges of organic cotton seed provision. The workshop is expected to:

- provide overview on GM and non-GM cotton production in India;
- picture on-going non-GM seed production in India (available varieties, propagation organizations, seed distribution, breeding projects);
- highlight quality aspects and needs of non-GM (organic) cotton seed production;
- depict a roadmap to increase availability and ensure quality of non-GM cotton seed in future.

We are looking forward to interesting presentations and a constructive dialogue.

Support

The workshop is supported by the University of Agricultural Sciences Dharwad, bioRe India (Ltd), Research Institute of Organic Agriculture (FiBL), Switzerland, Chetna Organics and Cotton Exchange India.

Location and time

The workshop will be hold at the University of Agricultural Sciences Dharwad (UASD), Karnataka. It will take place from 21 to 22 June 2011.

Workshop organisation

- Research Institute of Organic Agriculture (FiBL), Dr. Dionys Forster, Ackerstrasse, CH-5070 Frick, Switzerland
- bioRe India (Ltd), Director Rajeev Baruah, 5th km Milestone, Kasravad Mandleshwar Road, Tehsil Kasravad, District Khargone – 451228, Madhya Pradesh, India
- University of Agricultural Sciences Dharwad (UAS Dharwad), Dr. S.S. Patil, Dharwad - 580 005, Karnataka, India

2 Presentation

2.1 Cotton Seed Development Strategies

Dr. A. Barik, Directorate of Cotton Development (DOCD), Government of India, Mumbai, Maharashtra

Seed Breeding Workshop
Dharwad 21st June 2011

Cotton Seed Development Strategies

Dr.Anupam Barik
Director, DOCD, Mumbai

Indian Agriculture

Country	Population depend on Agriculture
India	50.8 %
China	38.5%
Brazil	6.4 %
Argentina	3.7 %
USA	0.9%

India's share in world agriculture

Land area -	2.4 %
Population-	17.5%
Agril land	57.0%
Agril Population	50.8%
Agril land/person	0.31ha
Irrigation	33.8%

India

Gross area	328.7 m.ha
Net sown area	141.0 m.ha
Cropping Intensity	134%
work force	58%
Total GDP	21%
Total export	11.1%
Annual Growth Rate	4.5%
Engaged in farming	60.4%
Holding less than	1.0 ha
NPK consumption	121 kg/ha

Per capita availability in India

Rice	188 g/day
Wheat	154 gm/day
Cereals	64 gm/day
Pulses	37 gm/day
Total food grain	444 g/day
Edible oil	12.1 kgs/year
Cotton	17.9 meters/year
Manmade fibre	21.1 meters /year

Cotton

Second largest kharif crop after rice

- 6.8% of total sown area
- 6.4 million cotton farmers
- Average cotton area 1.5 ha
- 65% dry land cotton
- 85% hybrid cotton

In Global Textile

- Largest area
- 2nd largest producer, consumer & exporter
- 2nd largest producer of cotton yarn
- Largest exporter of cotton yarn
- Highest loom capacity



Major crops of India

Crops	Area (m.Ha)	Production (m.tonnes)	World share (%)	Yield (kg/ha)	Yield (World)	% Irrigated
Rice	36.96	80.41	21.6	2177	4309	56.9
Wheat	28.52	80.72	11.4	2830	3086	90.9
Coarse Cereals	20.94	28.32		1348		14.2
Pulses	23.35	14.60	25.10	625	1850	16.2
Oilseeds	26.11	24.93	19.21	955	1554	27
Cotton	11.00	33.50	16.50	518	765	35
Jute	0.92	11.29	63.30	2216	2800	nil
Sugarcane	4.86	324.91	20.00	66922	71510	93.5
All India	141.00					

MSP & Economics of Major crops

Crops	MSP (Rs. / qtl)	Cost of cultivation (Rs/ha)	Production Cost (Rs/qtl)	Net profit Rs./ha
Rice	1000 to 1030	18000-22000	550-700	20-25000
Wheat	1100	15000-18000	650-850	22-30000
Coarse Cereals	880 -965	10000-12000	600-700	8-10000
Pulses	3000-3500	8000-10000	1600-2200	12-15000
Oilseeds	2000-2500	9000-12000	1200-1500	15-20000
Cotton	2500-3000	20000-25000	1500-2000	30-50000
Jute		16000-20000	1000-1100	20-25000
Sugarcane	139.12	40000-50000	75-100	25-35000

Price realization of Cotton cultivation

Commodities	Price hike (%)
12/09/10 to 12/10 2010	
Cotton	140
Wool	40
Linen	38
Silk	100
MMF	30-35

US cent per lb	
Nov 03	76.77
March 08	81.54
March 09	51.50
Aug 2010	90.35
Feb 2011	216.90

APY of Cotton in India

Year	Area	DES		CAB	
		Production	Yield	Production	Yield
2000-01	85.3	95.2	190	140.00	278
2001-02	91.0	100.0	186	158.00	308
2002-03	76.7	86.2	191	136.00	302
2003-04	76.0	137.3	307	179.00	399
2004-05	89.7	164.3	318	243.00	470
2005-06	86.8	185.0	362	244.00	478
2006-07	91.4	226.3	421	280.00	521
2007-08	94.3	258.8	467	315.00	567
2008-09	93.7	231.6	419	290.00	526
2009-10	103.29	239.35	393	293.00	482
2010-11	111.60	339.00	518	312.00	480
2011-12	115.00	365.00	540		
Area Lakh ha		Prod: Lakh bales		Yield : kg lint / ha	
Sowing done so far 22.00 lakh ha (2011-12)					

State wise Annual Growth Rate (2000-2009)

States	Compound growth rate (%)		
	Area	Production	Yield
Haryana	-3.95	12.54	17.15
Punjab	-1.75	7.23	8.35
Rajasthan	- 6.34	12.60	20.14
Gujarat	3.78	20.59	16.24
Madhya Pradesh	1.79	10.18	8.14
Maharastra	0.14	7.90	7.85
Andhra Pradesh	3.04	8.37	5.25
Karnataka	- 4.86	5.11	10.46
Tamil Nadu	- 6.59	- 6.70	0.98
Orissa	-1.03	13.07	5.32
UP & Others	22.83	25.10	- 3.40
All India	0.37	11.07	10.85

Global Bio-Tech crop coverage (2010)

- 29 countries adopted bio tech crops
- Global bio tech crop size 148 million ha
- Top eight countries

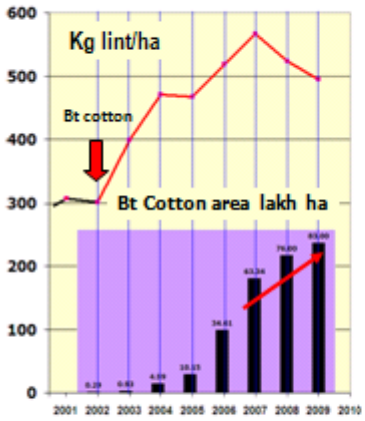
Countries	Biotech area (M.ha)	Major Crops
USA	66.8	Maize, Cotton, Squash, Papaya, Potato, Sugar beet, Soyabean, Alfaalfa
Argentina	22.9	Soyabean, Cotton ,Maize
Brazil	25.4	Soyabean, Cotton Maize
India	9.4	Cotton
Canada	8.8	Canola, Sugarbeet, Maize, Soyabean
China	3.5	Cotton, Sweet pepper, Tomato, Papaya
Paraguay	2.6	Soyabean
S. Africa	2.2	Soyabean, Cotton Maize
Global	148.00	

Bt cotton area (lakh ha) in India

Year	Total area	Bt area	% of total
2002-03	73.90	0.29	0.39
2003-04	78.35	0.93	1.18
2004-05	89.70	4.98	5.55
2005-06	88.73	10.14	11.42
2006-07	91.58	34.61	37.79
2007-08	95.06	63.34	66.0
2008-09	93.73	69.00	73.0
2009-10	99.85	79.82	79.93
2010-11	111,60	98.00	87.64
2011-12 (T)	115.00	105.00	91
Source: State Dept of Agril			

Country	Year	% Bt adoption
USA	96-2010	73
China	98-2010	82
India	02-2010	88

Immediate Issues on Bt cotton



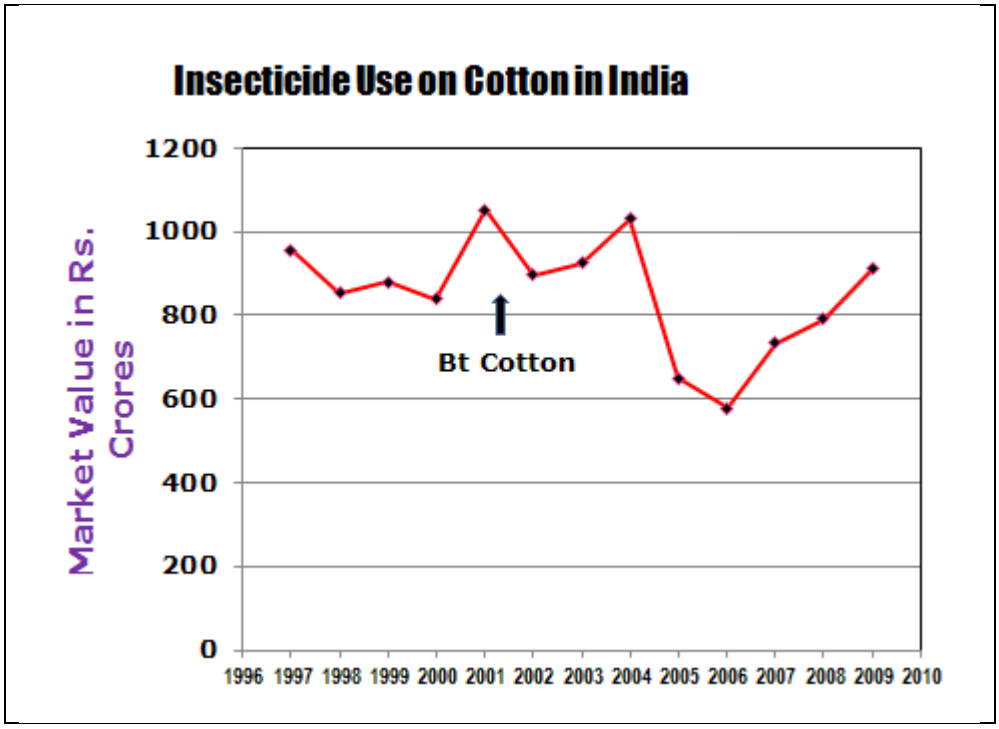
1340 Bt hybrids need recommendations
Under the TMC-MM-1 programme Jassid resistant hybrids are identified and the list is disseminated through TMC-MM-II

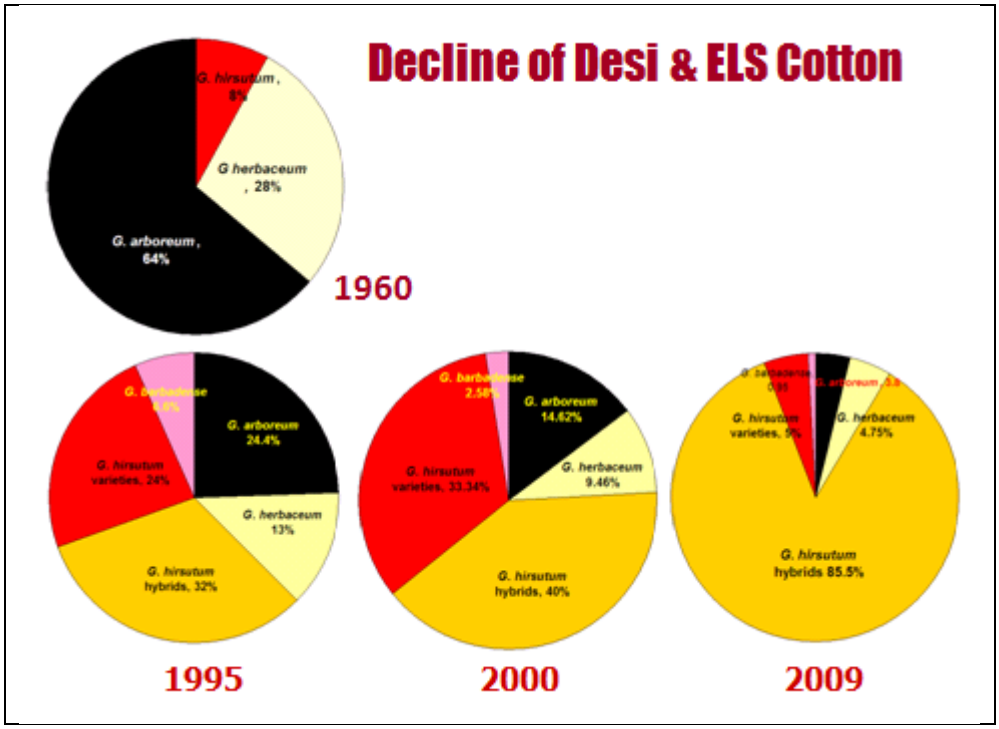
New Emerging pests & diseases
Mealybugs, mirid bugs, thrips, *Spodoptera*, gall midges, *Perigea capensis*, CLCuV, grey mildew and tobacco leaf streak virus, The management practices are spread through TMC-MM-II

Leaf Reddening
Hybrids have low harvest index: More vegetation, More fertilizer and pesticide requirement. High soil nutrient depletion. Wilt & leaf reddening are now severe in rainfed tracts. Strategies are disseminated through TMC-MM-II

No refugia compliance
90% Area under Bt-cotton, high risk of bollworm resistance development (8 to 32-fold R now). Bt-IRM strategies for *H. armigera* and PBW have been devised

Jassid Resistance to Gaucho All seeds are treated & crop is also sprayed with Imidacloprid (50 to 5450-fold R in 75% populations tested). Eco-friendly management strategies are disseminated through TMC-MM-II


Insecticide Use on Cotton in India
Market Value in Rs. Crores
1200
1000
800
600
400
200
0
Bt Cotton
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010


Decline of Desi & ELS Cotton
G. hirsutum , 8%
G herbaceum , 28%
G. arboreum , 64%
1960
G. barbadense 4.8%
G. arboreum 24.4%
G. hirsutum varieties, 24%
G. herbaceum 13%
G. hirsutum hybrids, 32%
1995
G. barbadense 2.58%
G. arboreum 14.62%
G. hirsutum varieties, 33.34%
G. herbaceum 9.46%
G. hirsutum hybrids, 40%
2000
G. hirsutum varieties, 9%
G. herbaceum 4.75%
G. hirsutum hybrids 85.5%
2009

ELS cotton in India

- World ELS area 6.50 lakh ha
- World ELS Production 30.00 lakh bales

- Requirement in India 20 lakh bales by 2015
- Present availability in India 4-5 lakh bales

- Golden era of ELS (1983-84 to 1989-90)
  - 11.46 lakh bales ELS
  - 13.25 lakh bales of MCU 5 (1968), Sujata(1969)
  - 12.21 lakh bales DCH 32(1981 release) ,TCHB 213, DHB 105
  - 0.44 lakh bales Suvin (1974 release)
- Private sector Bt hybrids , RCHB 702 Bt, RCHB 708 Bt, MRC 6918 Bt(2008-09)

Constraints of ELS

- Low productivity (4-5 qtls/acre in Suvin; 7-8 qtls /acre in DCH 32)
- long duration
- lack of awareness & Bt genotype
- high production cost
- Shortage & high cost of labour
- Lack of incentive based marketing support

Constraints & Suggestions to boost desi cotton

Production Constraints	Suggestions
Low yield with poor quality fibre	Long linted desi hybrids equal to *hirsutum* developed and need promotion in identified zones
Non availability of sufficient quantity seeds	Target oriented seed production programme by SSC , NSC , SAUs & ICAR
Rainfed & grown on marginal soils	Creating life saving irrigation & improving soil health
No special promotional activities	Special thrust & focus based programme at State & Central level and implementing the same through PPP mode
Non availability of Bt version	No desi cotton Bt variety/ hybrids so far
Better management practices	Intercropping, close spacing, low cost drip, farm pond
Long duration	Short duration variety suitable for double cropping
Lack of stable market	Offering attractive package in marketing of desi cotton

National Fibre policy

- **Future outlook**

Year	Production	Consumption	Surplus
2010-11	319	267	52
2014-15	384	323	61
2019-20	483	413	70
	Lakh bales		

- **Organic cotton**

World's largest producer

Year	Area(lakh ha)	Production (Lakh bales)
2008-09	2.00	5.00
2014-15	5.00	12.50

Suvin Cotton

1989-90 : 36000 bales

2008-09: 1250 bales

Global Organic cotton Status

- 22 countries are involved
- India, Turkey & Syria (87% production)
- Global area 1.61 lakh ha
- Production 6.68 lakh bales
- Area & Production increasing at faster rate
- From 2008 India ranks first in organic cotton production
- Syria, Turkey, China, Tanzania, United States, Uganda, Peru, Egypt and Burkina Faso

State wise Organic Cotton area & Production during 2008-09 in India
(Source APEDA)

	Organic		In Conversion	
States	Prodn (MT)	Area (ha)	Prodn (MT)	Area (ha)
AP	732	789	1504	2595
Delhi	0	0	1449	1073
Gujarat	6411	5059	10650	7959
Haryana	0	0	0	0
Karnataka	100	131	196	365
MP	106622	74964	27189	23060
Maharastra	37958	16567	15829	23093
Orissa	34425	30341	6375	5984
Rajasthan	0	0	3263	6338
Tamil Nadu	674	914	299	367
Total	186925	128769	66758	70838
Equal to (Lakh bales)	3.62	1.28	1.30	0.70

Major challenges in organic cotton sector

- **Gap in Research support** (recently started at UAS, Dharwad & TNAU, Coimbatore)
- **Poor availability of non GM untreated seed** (private seed company to be tie up)
- **Production of organic matter** (vermicompost beneficiaries to be associated)
- **High cost of certification**
- **Lack of standard package & practices** (two years study going on)

- **Long conversion period**
- **Lack of organic market**
- **Inadequate organic dyeing procedures**
- **Lack of inter-departmental coordination**
- **Lack of information, know-how & skills**
- **Reasonable Price premium structure**

Policy Initiatives in Seed Sector

- Enactment of the Seed Act -1966
- Seed Review Team - 1968
- Seed Contro Order – 1983
- ISOPOM-1986
- Production & Distribution Subsidy
- Distribution of Seed Mini kits
- National Seed Policy- 2002
- The Seed Bill 2004
- National Seed Plan -2005
- National Food Security Mission -2007
- Rastriya Krishi Vikas Yojana-2007

Seed Divisions Central Sector Schemes

Assistance for boosting seed production in the Private sector (25% cost limited to Rs.25 lakh)
Seed Village Scheme (50% cost for production of certified seeds)
Transport subsidy on Movement of Seeds (North Eastern states only)
Establishment & Maintenance of Seed Bank (For NSC & SFCI and SSC)
Quality Control arrangements on Seeds (Strengthening Quality Testin Organisations)
Human Resource Development (Traning of officilas)
Boosting seed export
Promoting Hybrid rice seeds (Rs.20-25/kg seed)
Use of Bio Technology in Agriculture (Training , Bt seed testing etc)
Crop Specific Schems (TMC, JTM, NFSM, ISOPOM, State Work Plan)

Salient Features

Seed Bill 2004

- Evaluation of Performances
- Compensation to the farmers
- Registration of seed producers & processing units
- Seed Dealers to be registered
- Seed analysis & seed testing
- Regulation of sale of seed & certification
- Export & Import
- Offences & punishment

National seed Policy-2002

- Varietal development
- Plant variety protection
- Seed production
- Quality assurance
- Seed distribution & Marketing
- Infrastructure Development
- Transgenic plant variety
- Import of seeds & planting materials
- Seed Export
- Promotion of Private seed sector
- Strengthening of monitoring system



Crop wise certified seed distribution

Crops	Quantity in Lakh qtls	
	1991-92	2008-09
Cereals	35.35	147.43
Pulses	3.29	14.48
Oilseeds	9.66	39.92
Cotton	1.77	2.27
Others	7.17	11.40
All India	57.50	215.81

Present Perception Of Indian Agriculture

- Presently Cotton sector is interfering with FOOD SECURITY OF THE COUNTRY
- The TMC mode approach is going to be dropped in 12 Plan period
- Assuming that farmers are now self sufficient to harvest a good crop
- Annual outlay on cotton reduced substantially
- National Food Security Mission (NFSM)
- Extending green revolution to Eastern India
- Nutritional Sequirity thriugh Intensive Millets Promotion (INSIMP)
- Agricultural Infrastructure development
- Improving soil health & Environment
- Increasing irrigation potentiality through water harvesting method & micro irrigation
- Tackling Global warming in Agriculture

Desirable output of Future cotton

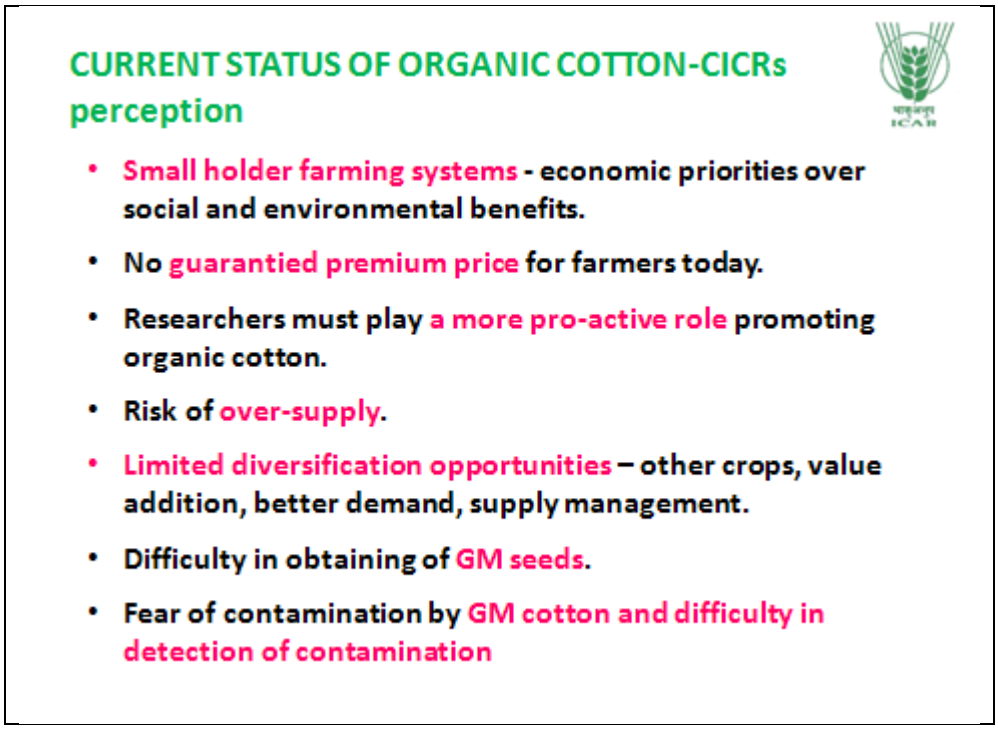
- Restricting increase of cotton area
- Marching towards cotton mechanization
- Drip & fertigation on large scale
- Public sector Bt variety/hybrids under deshi & ELS group
- Special thrust on Organic cotton Research & Development
- More awareness about quality procurement mechanism
- Crop Insurance & stable MSP as per species
- APMC oriented procurement mechanism
- Increase in domestic consumption & value added textile product
- Commercialization of cotton by product use such as cotton stalk, seed oil, cake, linter etc.

THANK YOU

WE ALL HAVE TWO HANDS - ONE TO HELP OURSELVES AND ONE TO HELP OTHERS

2.2 CICR: Fostering linkages to support organic cotton programmes

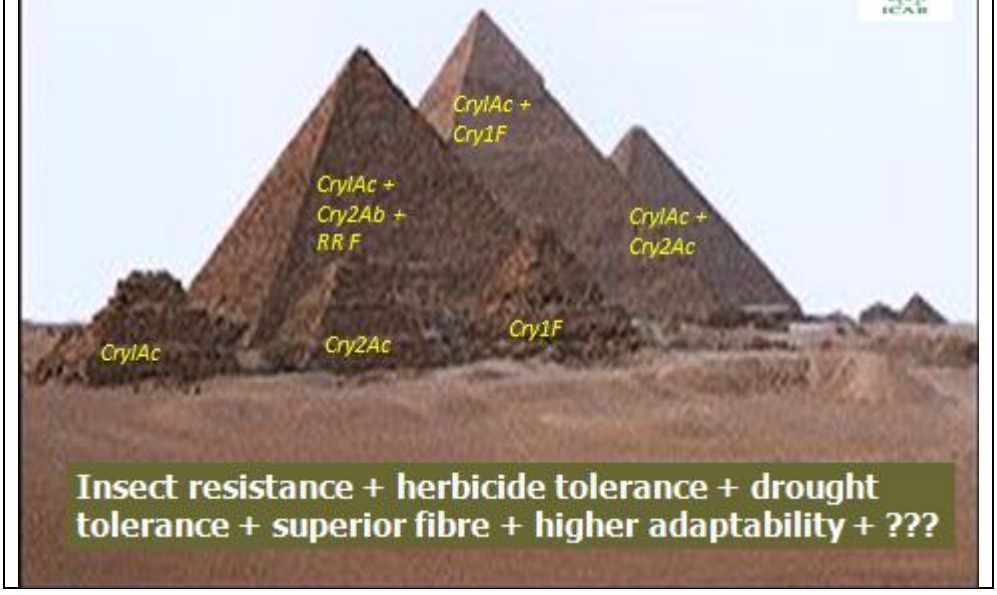
Dr. M. V. Venugopalan, Central Institute for Cotton Research (CICR), Nagpur, Maharashtra



Genetically Modified Cotton: Events

Event	Trade name	Company	Trait	Insert	Marker
Events approved in India					
MON15985	Bollgard II	Monsanto	Insect Resistant	Cry2Ab	*Aad+nptII + uidA*
MON 531	Bollgard	Monsanto	Insect Resistant	Full length *Cry1Ac*	*nptII*
GFM-Cry1A	Fusion-Bt	CAS, China	Insect Resistant	Truncated *Cry1Ac*	*nptII*
Event-1	JK-Bt	JK Seeds	Insect Resistant	Truncated *Cry1Ac*	*nptII*
BN-Bt-LA01	BN-Bt	UAS & ICAR	Insect Resistant	Truncated *Cry1Ac*	*nptII*
MLS9124	-	Metahelix	Insect Resistant	Cry1C	*nptII*
Events approved worldwide					
31807,31808	-	Calgene inc	Insect Resistant	*Cry1Ac*	*nptII*
BXN	BXN Cotton	Calgene inc	herbicide tolerance	*bxn gene*	*nptII*
MON 1445/1698	Roundup Ready	Monsanto	herbicide tolerance	EPSPS	*nptII*
MON 757/1076	Bollgard	Monsanto	Insect Resistant	*Cry1Ac*	*nptII*
281-24-236	-	DOW	Insect Resistant	*Cry1F*	*pat*
281-24-236x3006-210-23	WideStrike	DOW	Insect resistance	*Cry1Ac+ Cry1F*	*pat*
MON88913	Roundup Ready Flex	DOW & Pioneer	herbicide tolerance	EPSPS	*nptII*
3006-210-23	-	DOW	Insect Resistant	*Cry1Ac*	*pat*
LL-Cotton 25	Liberty Link cotton	Bayer & Aventis	Herbicide tolerant	*Bar/* phosphinothricin N-acetyltransferase	*Bar*
COT-102	VipCot	Syngenta	Insect Resistant	Vip3A	*nptII*

Pyramiding genes –makes detection for GM more challenging

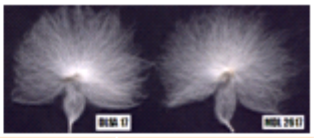


Products/services and support from CICR (ICAR)

- Testing for non-GMO seeds and assistance in setting up testing facilities to detect GM cotton
- Assist promotion of organic *G. arboreum* cotton - to minimize GM contamination
- Organic seed production based on a prior demandand support to seed production in organic farms
- Biophysical and socio-economic sustainability assessment of organic production systems -partnership mode
- Consultancy/advisory and R&D back including development and testing of organic product-mealy kill and mealy quit, microbial consortium etc.
- Training in organic cotton production technology and in detection of GMO in organic cotton.

Varieties & Hybrids released from CICR in the past 10 years

Development of long linted *G. arboreum* by public sector



S.N	Genotype	2.5% S.L.(mm)	MIC	Strength (g/tex)
1	CINA 344	28.2	4.6	20.1
2	PAIG 8/1	28.1	5.3	22.6
3	CINA 316	27.6	4.8	21.3
4	MDL 2463	27.4	4.6	23.6
5	AKA 9503	27.1	4.4	23.2
6	KWA 140	27	5.1	23.5
7	DLSa 56	27	4.9	22.8
8	PA 402	26.9	4.2	22.6
9	CINA 318	26.6	5.9	22.8
10	KWA 225	26.5	5.3	22
11	MDL 2607	26.4	5	22
12	AKA 9136	26.3	5.4	22.6
13	LAS 2	26	4.4	21.2
	PA 255 (Check)	25.4	4.5	20.1
14	GAM 93	24.6	4.6	20
15	AKA 8	23.7	5.4	21.4

CICRs expectations

- A consolidated seed indent before the sowing season
- Current organic cotton growing package in different areas
- Training requirement-nature and duration and number of participants (consolidated)
- Researchable issues where CICRs intervention is needed
- Feedback on the performance of varieties developed by public sector in organic farms

THANKYOU

2.3 Organic cotton markets and challenges

Ms P. Nagarajan, Regional Director Textile Exchange, Chennai, Tamil Nadu

WHY COTTON?

Improving organic cotton production addresses key environmental issues impacting cotton

Facilitates discussions about agricultural issues worldwide including:

- biodiversity,
- food security,
- poverty alleviation,
- strengthening rural communities

water quality and utilization, soil protection, and climate change impacts.

TextileExchange
Creating Material Change

OUR APPROACH …

- Textile Exchange brings together brands, retailers, supply chain partners, farmers, and other key stakeholders to learn about the social and environmental benefits of organic agriculture and develop new business models and tools that support greater use of organic fibers and sustainable textiles.

TextileExchange
Creating Material Change

Since 2002 we have helped..

- Grow the global organic cotton market ….
- Make the business case for implementing an organic fiber program as part of a larger strategy that aligns business and environmental decisions.
- Educate stakeholders about certified organic fibers so consumers can reap the benefits of the beauty, comfort, and performance of products, while minimizing harm to people and the planet..
- Work with sourcing groups, executive management, marketing teams, supply chain partners, or new vendors to implement a successful organic cotton program.
- Keep members and industry partners up-to-date on issues that affect the organic fiber market, as this global market segment continues to evolve.

TextileExchange
Creating Material Change

WHO IS IN THE MARKET?

- Some of the worlds largest brands and retailers..
- Small niche brands
- Individual designers and fashion gurus.
- Industry specific sourcing groups.

TextileExchange
Creating Material Change

Major brands in the market place....

1. C&A
2. Nike
3. Walmart / Sam's Club
4. Williams - Sonoma (Pottery Barn)
5. H&M
6. Anvil
7. Co Op , Switzerland
8. Greenhouse
9. LeviStrausse .
10. Target t
11Adidas
12. Nordstrom

TextileExchange
Creating Material Change

Several brands have committed organic lines of garments .

TextileExchange
Creating Material Change

Some other leading Brands ….

Marks & Spencer, Gap, New Look. and Timberland .

Smaller ethical fashion names such as People Tree, Howies, and Green Baby,.

Specialist retailers such as Greenfibres and Seasalt.

TextileExchange
Creating Material Change

Why People bought Organic…

Top ten reasons

Naturalness/unprocessed 40%
Restricted use of pesticides 34%
Better taste 30%
Better for my well-being 28%
Better for the planet 25%
More care in farming 24%
Kind to animals 22%
GM free 18%
Encourages wildlife 16%
Helping climate change 12%10

TextileExchange
Creating Material Change

Recession and Organic cotton markets

While the recession had a significant impact on the overall economy, nonetheless substantial growth in the use of organic cotton on the part of several of the Top Twelve companies.

This was particularly the case with C&A and Nike.

Brands such as Adidas, Anvil Knitwear, H&M, and Williams-Sonoma Also registered good growth in 2009 over 2008.

Sales have remained the strongest when companies have figured out their supply chain, customers, and product mix.

innovative manufacturers and retailers around the world initiated or dramatically expanded organic cotton programs.

TextileExchange
Creating Material Change

Why markets remained strong?

In a down economy, why would brands and retailers increase their use of organic cotton
and other fibers considered more environmentally preferable?

They found that the world has changed and it now makes more sense
for the bottom line to adopt programs based in the three tenets of sustainability –
Economy, Environment, and Social Support.

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So what do we see?

- A significant increase in textile product transparency, tracking and tracing of raw materials, environmentally-preferred processing practices, an ongoing worldwide effort to improve fair labor practices, reduced energy and water use, and other positive developments.

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What kind of Products?

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Major Regions Producing Organic Cotton

United States of America
- Texas
- New Mexico
- California

Latin America
- Peru
- Paraguay
- Brazil
- Argentina*
- Nicaragua

Africa
- Benin
- Burkina Faso
- Mali
- Senegal
- South Africa
- Zambia
- Tanzania
- Uganda

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Europe, Middle East & North Africa
- Israel
- Egypt
- Greece
- Kyrgyzstan
- Syria
- Tajikistan
- Turkey

China
- Xinjiang District

South East Asia
- Pakistan
- India
  Madhya Pradesh
  Maharashtra
  Gujarat
  Orissa
  Karnataka
  Tamil Nadu
  Andhra Pradesh
  Rajasthan

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Global Production Figures, 09/10

Country	MTs LINT
India	195,000.03
Syria	20,000.00
Turkey	10,660.00
China	4,300.00
USA	2,822.50
Tanzania	2,635.00
Uganda	2,300.00
Peru	831.28
Egypt	666.00
Mali	540.83

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INDIA, GLOBAL LEADER SINCE 3 YEARS

- In 2007 / 2008 India overtook Turkey to become global leader.
- Production in 0708 was 73908 Mts, 50.67% of global
- In 0809, 142347 MTS ,61.41% of global.
- In 0910, 195000 MTs , 80% of Global

TextileExchange
Creating Material Change

DRAMATIC GROWTH ,CRITICAL PROBLEMS……..

Many major issues crying out for attention from stakeholders..

Top 3

1. LACK OF INTEGRITY.
2. LACK OF POLICY AND RESEARCH SUPPORT
3. CRITICAL SHORTAGE OF INPUTS , MOST IMPORTANTLY SEEDS.

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Creating Material Change

INTEGRITY IS EVRYONES BUSINESS..

On going efforts by concerned stakeholders…

Some efforts by APEDA such as Tracenet and reducing group size.

Much more work needs to be done to have credibility.

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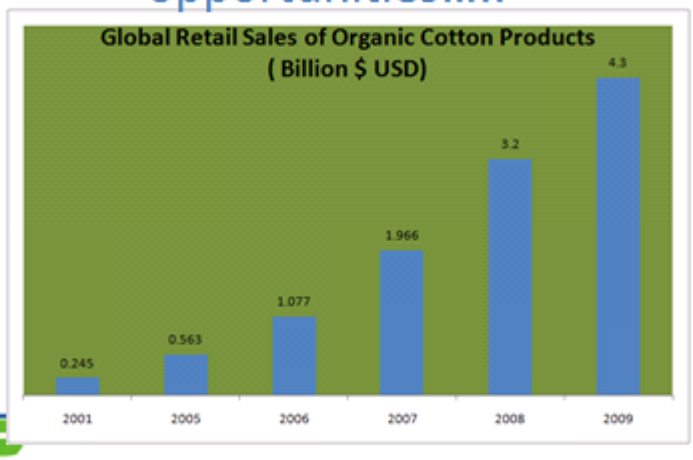
Growing markets, growing opportunities.....

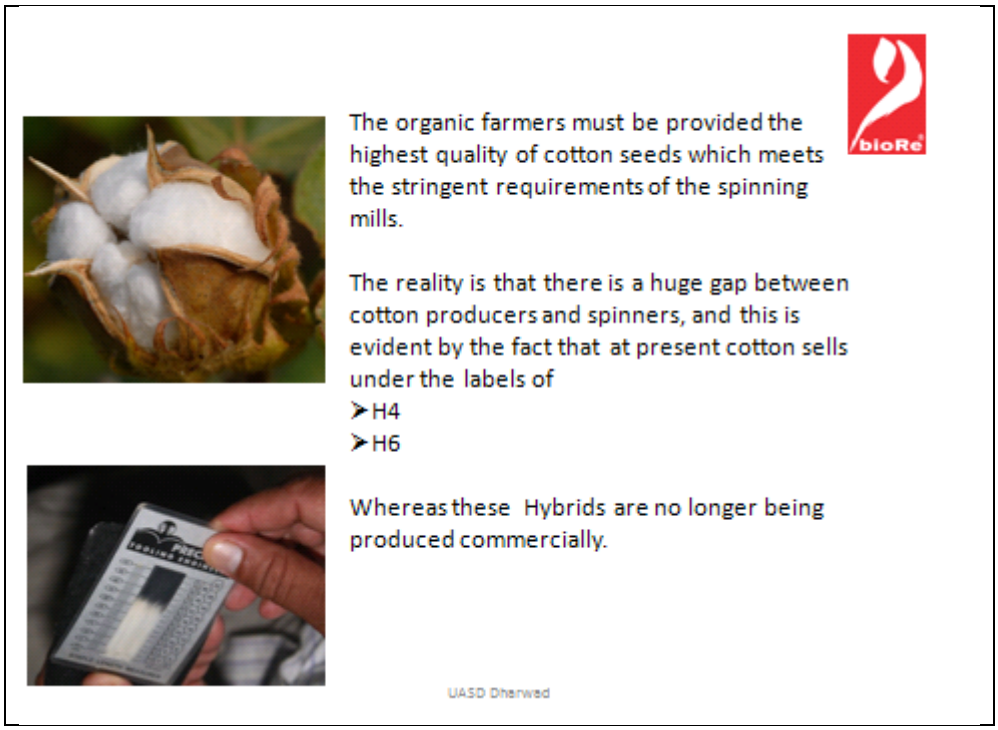


TextileExchange
Creating Material Change

Thanks ...for listening....

2.4 Ensuring organic cotton quality and certification today

Mr R. Baruah, Director bioRe India (Ltd), Khargone District, Madhya Pradesh



Farmers to mitigate their risks generally plant 2 to three brands of cotton and these are all mixed up during and picking and hence getting quality data is next to impossible, unless serious efforts are made, and most spinners have no connection to farmers at all.

In the conventional cotton business ginners/ spinners buy in the open market select the best cotton from the `mandis'.

In case of organic cotton almost all organizations have a purchase guarantee towards the farmers and since most of them provide seeds they are bound to purchase the cotton back from them and cannot be selective of quality.

UASD Dharwad

Certification

Exhaustive work needs to put in to achieve the certification of the farmers in accordance with the Indian Standards of Organic Agriculture.
Briefly the steps are as follows:
Training of farmers
Extension services
Mapping the entire fields of the farmers and now marking the same with GPS locations, updating the crops at the time of Kharif and Rabi.
Seeds (untreated/ non GMO seeds have to be provided to the farmers, all pest and fertility management activities need to be documented

UASD Dharwad

Internal Inspection data, and all purchase date from each and every farmers needs to be documented accurately.
Since May/ June 2010 APEDA has launched its Tracenet Software where all farmers details, areas, crops, yield estimations, all purchase information from individual farmers have to entered one line, without this no Certification body will issue any form of certificates.

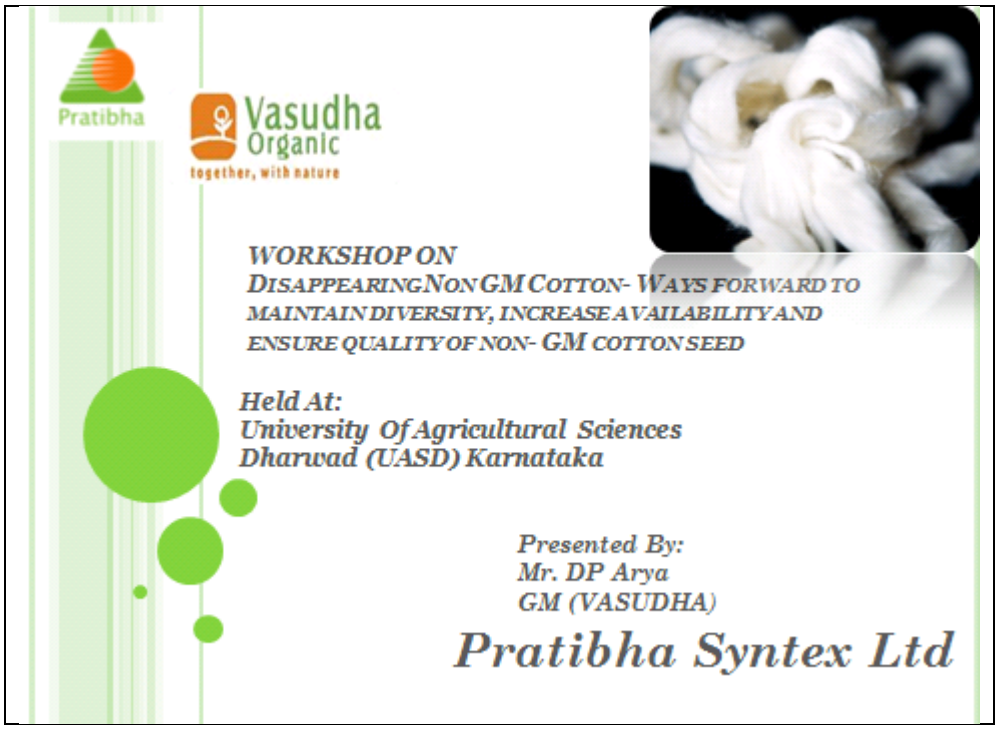
With this one can see the magnitude of the work that needs to be done, in very very remote areas by personnel who are not necessarily graduates from agricultural backgrounds.

Quote from 9th May HT Indore edtion

30 brands of BT hybrids available in the market, last year it was `rassi' as the most sought after and this US President Obama vs Bollywood Diva Mallika..
As brands multiply it is increasing difficult for cotton farmers to decide on the right seed brand... it there is brand called `Ganesha' then rival dealers introduce another brand called `Super Ganesha.. for farmers it becomes a difficult task to select the genuine ones....

2.5 Cotton quality requirements for the industry

Mr D. P. Arya, Pratibha Syntex, Indore, Madhya Pradesh



INTRODUCTION:

- Pratibha is one of the full vertically integrated supplier of all types of knitted textile products including organic and recycled.
- Every step from fiber cultivation to knitted apparel production, is a part of Pratibha and the Vasudha Organic Cotton Farming Project Est.. 1999
- Vasudha Project is supported by technical supervisors and agronomists who closely work with farmers to improve farming practices for increase yields with minimum inputs.

QUALITY STANDARDS (PRATIBHA SYNTEX)

COTTON PARAMETERS

Cotton	MECH-1	Hy-6	Hy-4
Length (2.5% S.L)	Above 29	Above 29	Above 28
Uniformity Ratio	Above 47.5	Above 47.5	Above 47
Strength (g/tex)	Above 22	Above 23	Above 21
Elongation	Above 5.5	Above 5.5	Above 5.5
Micronaire Value	3.8 to 4.40	3.8 to 4.40	3.50 to 4.00
Neps Cnt/gm	Below 130	Below 100	Below 150
Trash (%)	Below 3.40%	Below 2.80%	Below 3.50 %

SIGNIFICANCE OF QUALITY PARAMETERS

FIBRE LENGTH:

- Fibre length is the average length of the longer one-half of the fibres (upper half mean length). it is reported in both 100ths and 32nds of an inch.

SIGNIFICANCE:

- Fibre length is largely determined by variety, but the cotton plant's exposure to extreme temperature's, water stress, or nutrient deficiencies may shorten the length. excess cleaning and/ or drying at the gin may also result in shorter fibre length.
- Fibre length affects yarn strength, yarn evenness and the efficiency of the spinning process the fineness of the yarn that can be successfully produced for given fibres is also influenced by the length of fibre.

Length Uniformity:

- Length uniformity is the ratio between the mean length and the upper half mean length of the fibre and is expressed as percentage. There is a natural variation in the length of the fibre, so length uniformity will always be less than 100.

Degree Of Uniformity	HVI Length Uniformity
Very High	Above 85
High	83 - 85
Intermediate	80
Low	77 – 79
Very Low	Below 77

- **Effect Of Length Uniformity:**

  - It affects yarn evenness and strength, and efficiency of the spinning process. It is also related to short fibre content (fibre shorter than one-half inch). Cotton with a low uniformity index is likely to have a high percentage of short fibres. Such cotton may be difficult to process and is likely to produced low quality yarn.

- **FIBER STRENGTH:**

  - Strength measures are reported in terms of grams per tex. A tex unit is equal to the weight in grams of 1,000 meters of fiber. Therefore, the strength reported is the force in grams required to break a bundle of fibers one tex unit size. The following tabulation can be used as a guide in interpreting fiber strength measurements.

Degree Of Strength	HVI
Strength	Grams per tex
Very Strong	31 & Above
Strong	29 – 30
Average	26 - 28
Intermediate	24 - 25
Weak	23 & Below

Fibre Strength is largely determined by variety. However, it may be affected by plant nutrient deficiencies and weather

MICRONAIRE:

- Micronaire is a measure of fibre fineness and maturity. An airflow instrument is used to measure the air permeability of a constant mass of cotton fibres compressed to a fixed volume. Micronaire measurements can be influenced during the growing period by environmental conditions such as moisture, temperature, sunlight, plant nutrients, and extremes in plant or boll population.

SIGNIFICANCE

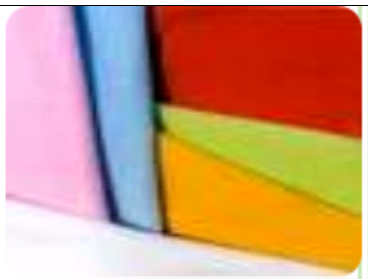
- It affects processing performance and the quality of the end product in several ways. In the opening, cleaning, and carding processes, low-micronaire, or fine fibre, cottons require slower processing speeds to fibre per cross-section, which in turn produces strong yarns. Absorbency and retention varies with the maturity of the fibers, the greater the maturity, the better the absorbency and retention.

COLOUR:

- The colour of cotton is determined by the degree of reflectance (Rd) and yellowness (+b). Reflectance indicates how bright or dull a sample is, and yellowness indicates the degree of colour pigmentation.

Effect Of Colour:

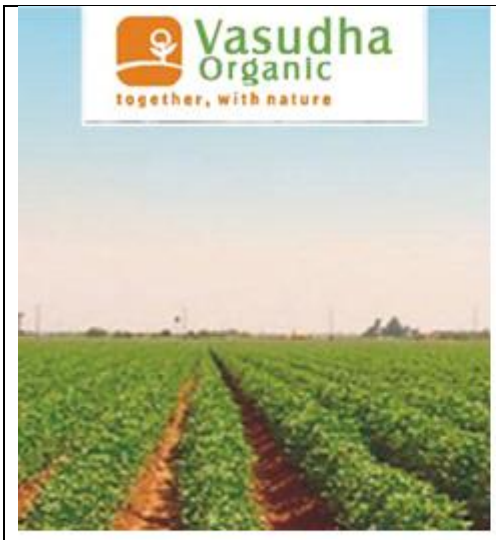
- The colour of cotton fibres can be affected by rainfall, freezes, insects, fungi, and stained by contact with soil, grass, or the cotton plant's leaf. Also, excessive moisture and temperature levels affect colour when cotton being stored, both before and after ginning. It also affects the ability of fibres to absorb and hold eyes and finishes.



- **Trash:**
  - Trash is a measure of the amount of the non-lint materials in the cotton, such as leaf and bark from the cotton plant. Extraneous matter is any substance in the cotton other than fiber or leaf. Examples of such substance is bark, grass, spindle twist, seed coat fragments, dust, and oil. The ratio of trash in the lint should be below 2.5%

IMPACT OF QUALITY OF COTTON

- **Impact on Economy**
- **Impact on Industry**
  - **Affects the cotton prices, export prices**
  - **Major effect on Employment**
- **Impact on Environment:**
- **Impact on Health**
- **Impact on Livelihood**

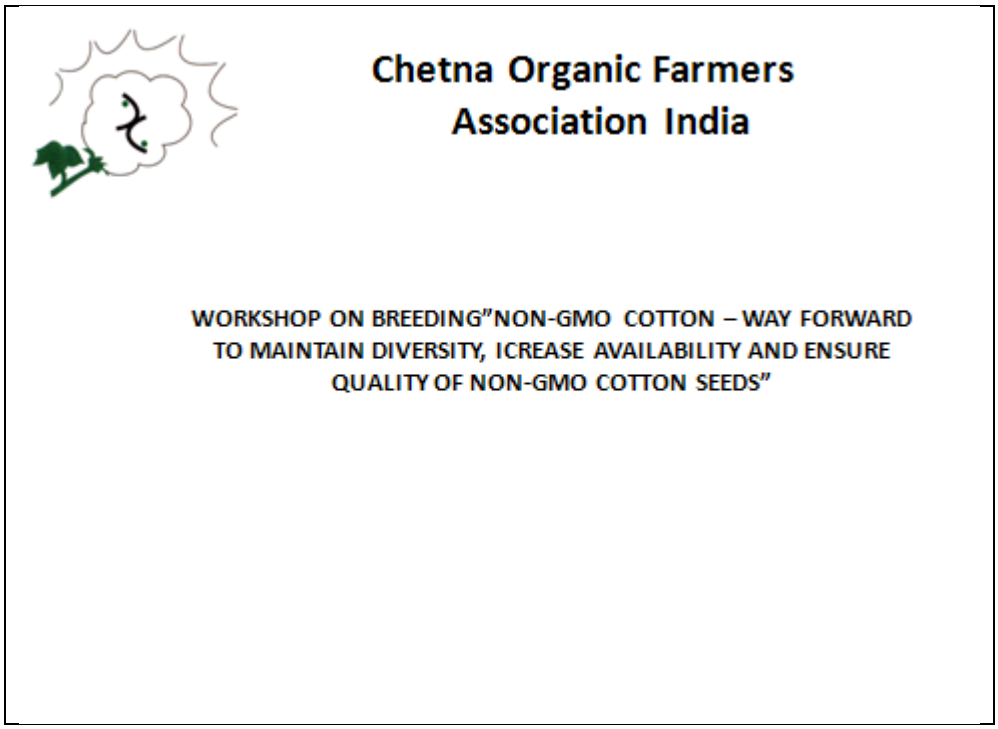


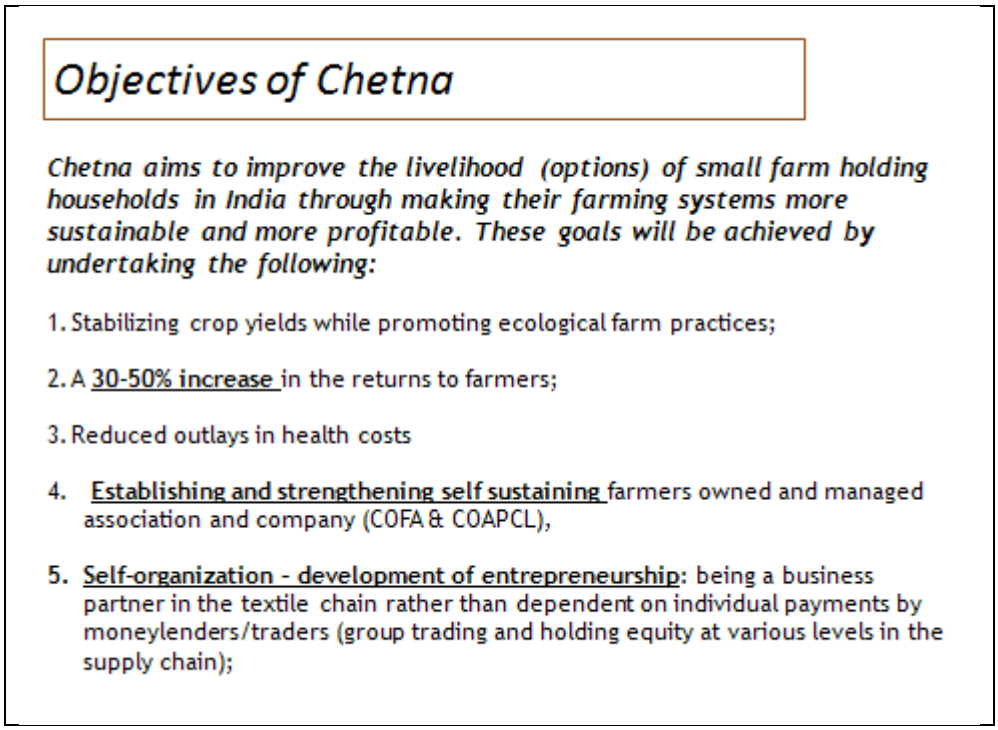
WHY ORGANIC COTTON:

- Organic cotton is especially safe for people with allergies and chemicals sensitivity as well as for babies and children.
- Organic cotton has the added advantage of safe guarding the environment,, water quality and health of the people who grow manufacture and use.
- Choosing organic cotton helps to support organic farmers and gives motivation to conventional farmers who are trying to convert to organic practices.

2.6 Experienced challenges and solutions of Chetna

Mr A. Ambatipudi, Chetna Organic, Hyderabad, Andra Pradesh





Objectives of Chetna (Contd...)

6. **Up-scaling the production of organic/NPM agric. produce** by small holder farmers in India such that volumes become a significant part of mainstream trade.

7. Farms have **improved conditions for labor;**

8. **Enabling Govt. policies in support of revitalizing rainfed agriculture;**

9. **Policy, advocacy and campaigns** relating to institutionalization of responsible credit, insurance and market policies and agro-ecology

.... STARTED in 2004 as an Organic Cotton Intervention Project in rain-fed regions of India

The first farmer's field school – *Imparting technical knowledge*

Farmers: 234 (19 groups)

Presence in: 06 districts in 02 Regions (Andhra Pradesh - Telengana and Maharashtra -Vidarbha)

Human Resource: Fulltime (09); Consultants (03)

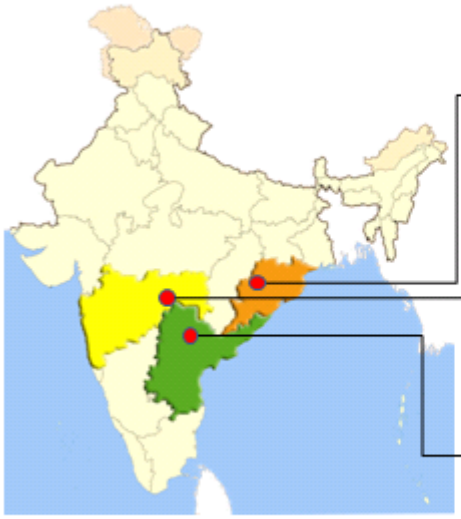
Partner NGOs/CBOs: 05

Infrastructure: PMU (Hyderabad) + 03 part time field offices @ cluster level

.... CHETNA Progress (2004 – 2010)

	2004	2005	2006	2007*	2008	2009	2010
# Op. States	02 (AP+MH)	02	02	03 (+OR)	03	03	03
# Op. Dists	06	06	06	09	09	09	09
# Villages	14	35	75	490	490	550	571
# Farmers	234	450	900	7,200	5,500	7,200	8,138
# Groups	19	44	78	540	450	550	571
# Coops	0	0	03	05	08	09	09
Human Resource - Fulltime - Consultants (Part time)	 14 03	 20 05	 22 05	 26 03	 30 02	 35 02	 40 05
Infra-structure - PMU (Hyderabad) - Cluster Offices - Field Offices	 01 03 0	 01 03 0	 01 04 01	 01 05 03	 01 05 03	 02 03 07	 02 03 08
Partner NGO / CBO / Govt.	06 (+2)	06 (+3)	05 (+3)	09 (+4)	12 (+3)	12 (+3)	18 (+3)
Network partners	0	0	0	8+7	8+7	8+7	8+7+12
Marketing of lint (M. Tons)	50	120	250	450	400	400	1200*

... **TODAY,** Chetna supports a membership base of over 8,138 farmers from 290 villages in three states (9 districts) who organized into 571 groups (SHG/CIG) and federated into 9 farmer cooperatives from 290 villages in three states



ORISSA (SW)
02 Districts
92 Villages
2,995 Farmers
216 Farmer Groups
04 Co-operatives*

MAHARASHTRA
04 Districts
109 Villages
3,745 Farmers
230 Farmer Groups
03 Co-operatives

ANDHRA PRADESH
03 Districts
89 Villages
1,398 Farmers
125 Farmer Groups
02 Co-operatives

Major challenges With Cotton Seeds

- Non-availability of non-Bt cotton seeds
- Need for seeds responsive to organic nutrient management in low input environments

Why this situation arose?

- More than 95% of the cotton area is under Bt
- Companies have stopped producing non-Bt cotton seeds
- The demand for non-Bt cotton seeds is quite less compared to Bt seeds
- Bt is largely promoted by both public & private sector
- Aggressive marketing strategies and lobbying by private seed companies

Challenges for organic cotton projects

- Farmers may get back to conventional cotton production at any point of time and use Bt seeds.
- Proving themselves to be organic increases cost of production for farmers
- Govt. de-notifying certain varieties & hybrids saying it cannot compete in markets with private sector

Seeds ordered and procured by Chetna cooperatives

Hybrid	AP (Adilabad)		MH (Yavatmal, Akola, Amaravati)		Orissa (Kalahandi, Bolangir)	
	Required	Available	Required	Available	Required	Available
Bunny (NSL)	600	1017	600	300	2000	2000
Super Bunny (NSL)	600	00				
Mallika (NSL)	1800	2853				
NH44 (Mahabeej)			600	00		
PKV 468 (Mahabeej)			500	00		
Ankurakka						
Mauti9632(Krishidhan)			1500	00		
Ajinkya (Mahabeej)			800	00		
Vijetha (Mahabeej)			300	00		
Ankur 561			1000	1000		

Reasons attributed by seed companies for non-availability of Non-GM Hybrid Seeds

- Completely stopped production due to very less demand
- Converted all their conventional hybrids into Bt.
- Non-remunerative to get into production of conventional hybrids

Chetna's efforts so far since 2007

- Took trials of ADB-532 and ADB-39 in Adilabad, but performance was very poor.
- The seeds were obtained from Adilabad research station.

Hybrid seeds production

- Obtained parental lines from CSA
- Produced hybrid seeds after which F1 was tried in 1 acre, could get yield of 5 qtls per acre.
- But selfed parental lines didn't germinate when planned to produce seeds for subsequent years

Hybrid seeds production

- Also obtained another set of parental lines from CSA the seeds production of which has been taken up in Akola, Maharastra.
- F1 to be tested this year.

Plans for 2011-12

Varietal trials.

- Identified 2 acres of land in each of the project states.
- Obtained 20 varieties of cotton from CICR, SIMA cotton seeds and other local research stations
- Yet to obtain some more varieties from UAS, Dharwad
- All these varieties will be tested in 2 acres plot
- Best performing variety will be multiplied during summer and used for next season.

Hybrid seeds production

- If UAS Dharwad spares parental lines of Varalaxmi, the production will be taken up in 1 acre on trial basis and will be increased in coming years based on the demand.

Varietal Trials of Chetna

Pollination at seed production

Seed production plot of Chetna

SEED BANKS

In order to conserve the rich biodiversity and regenerate the erased local verities of seed, Chetna Organic encouraging its farmer cooperatives to establish the seed banks to collect the diverse seed verities, tests it to document the varietal characteristics and propagate among the farmers.

Respective cooperatives collect the diverse seed vaerities from each of the farmers and segregate according to the variety and document each seed varietal characteristics. Farmers are encouraged to collect the verities from the seed bank at the prescribed rate. Selected farmers will take up the responsibility for the seed production to produce quality seeds which will be purchased by the cooperative for redistribution among its members.

So far, three cooperatives established such seed banks with over 9000 KGs of different verities of seeds in each seed bank.

COLLABORATION WITH SEED BREEDERS FROM THE FARMING COMMUNITY

Chetna is also identifying the seed breeders of cotton and other crops to collaborate with them for trying the new vaerities across the different vaerities and popularizing among the farmers. In this context, Chetna identified Nagappa through Sahaja Samrudha, an alliance partner of Chetna on various advocacy campaigns

FUTURE PLANS

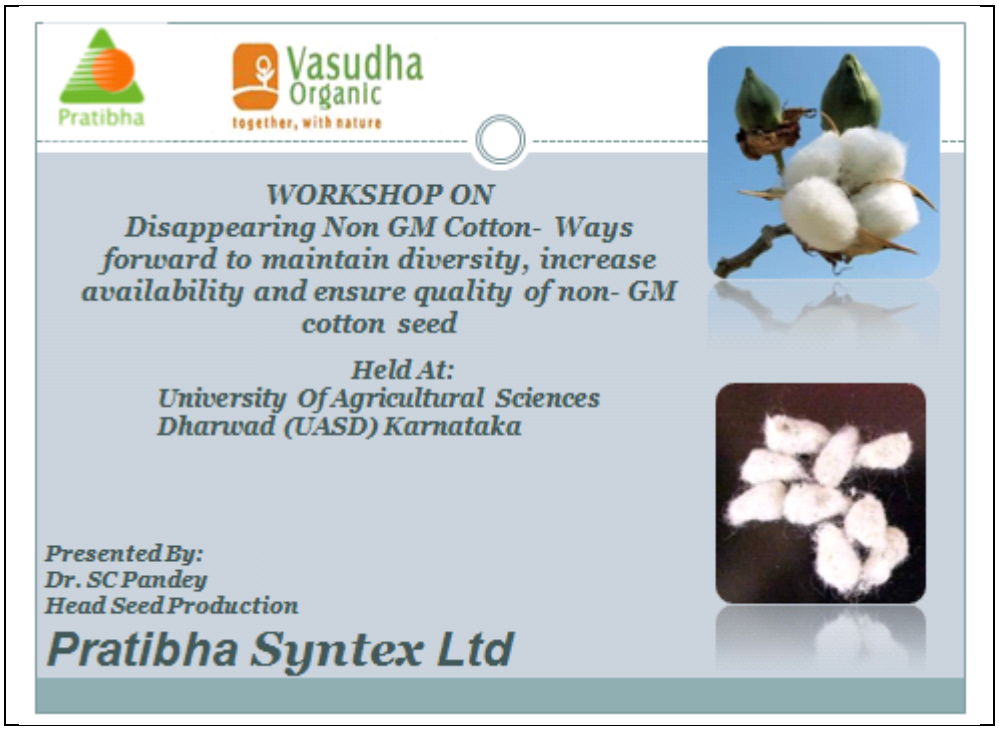
Various traditional varieties of crops (Cereals, oilseeds, pulses, cash crops, fruits, vegetables, and flowers), indigenous livestock and poultry breeds becoming extinct and inaccessible. In this context, Chetna would like to reverse the trend toward extinction of local crop varieties to maintain the diversity.

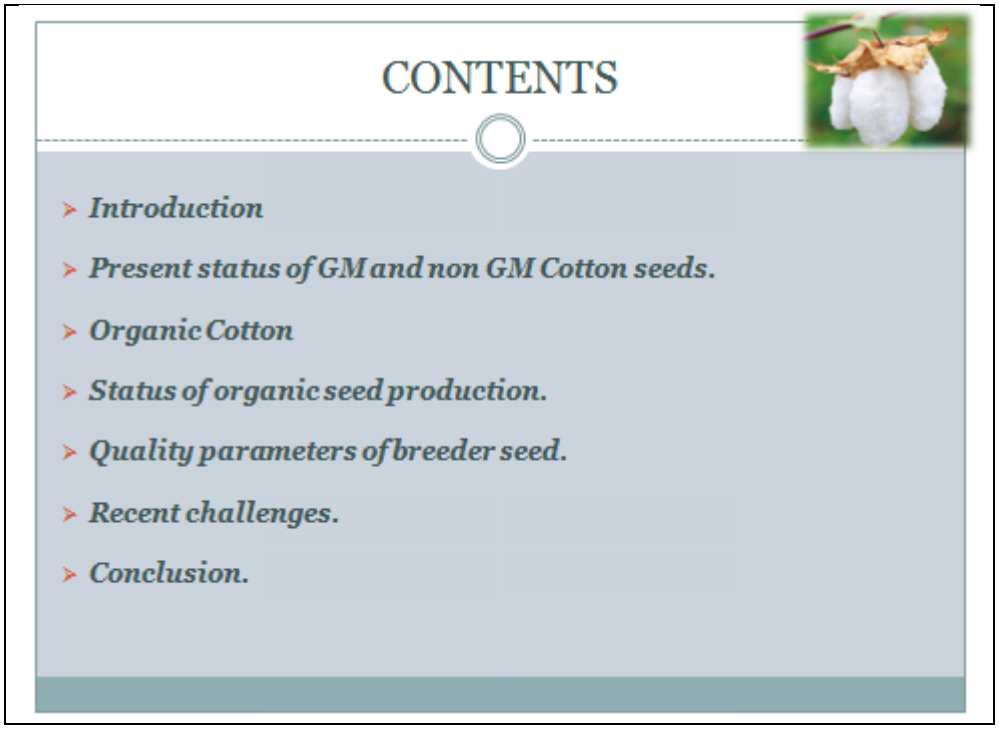
In this regard Chetna is planning to set up a germplasm conservation centre in Lanjigarh (Orissa) where in all the verities of crops and rare breeds of animals will be conserved to build it as learning center for the farmers to emulate the similar models of ecological and integrated farming systems model.

Chetna is also planning to expand its efforts on seed production and conservation towards promoting self reliance of the farmers over seeds. However, Chetna requires intellectual and financial resources to scale up and mainstream the interventions over the rigid seed laws in India.

2.7 Experienced challenges and solutions of Pratibha Syntex

Dr S.C. Pandey, Pratibha Syntex, Indore, Madhya Pradesh





Introduction

- Pratibha is one of the world's largest full vertically integrated supplier of all types of knitted textile products including organic and recycled.
- Vasudha Project (founded 1999) aims to expand organic cotton farming culture in India and lead the wave of sustainable change through the SEED Initiative and quality of Non-GM Seed.
- Presently 88% of India's cotton area is grown with genetically modified Bt-cotton,
- In M.P. approximate 90% area is covered with Bt-cotton,
- The Pvt and Public Sector have withdrawn production of Non-GM Cotton Seeds
- The sustainability of the Organic Cotton Projects have become critical

Present status of Bt Cotton Area in India .

Year	Total Area	Bt Area lakh Ha	% of Total
2002-03	73.90	0.29	0.39
2003-04	78.35	0.93	1.18
2004-05	89.70	4.98	5.55
2005-06	88.73	10.14	11.42
2006-07	91.58	34.61	37.79
2007-08	95.06	63.34	66.0
2008-09	93.73	69.00	73.0
2009-10	99.85	79.82	79.93
2010-11	110.55	98.00	88.64
2011-12	115.00	105.00	91

Country	Year	% Bt Cotton
USA	96-2010	73
CHINA	98-2010	82
INDIA	02-2010	88

State Wise Split of Bt Cotton In India

State	2009-10 (R) (lakh bales)	10-11 (E) (lakh bales)
Punjab	14.25	16.47
Haryana	14.75	13.84
Rajasthan	11.00	6.46
Gujarat	98.00	106.82
Maharashtra	63.00	77.31
Madhya Pradesh	15.00	18.04
Andhra Pradesh	52.00	65.68
Karnataka	9.00	10.15
Tamil Nadu	5.00	6.71
Orissa	-	2.00
Others	1.00	2.00
Loose Supply	12.00	-
Total	**295.00**	**325.48**

Parameters That Influence Cotton Yield

Cotton yields obviously are not only determined by the farming system (i.e. organic or conventional farming) but also by a number of factors not inherent to the farming system, like site conditions (soil types, rainfall, the quality of seed and other inputs)

Organic Cotton

- Organic cotton is grown using methods and materials that have a low impact on the environment. Organic production systems replenish and maintain soil fertility, reduce the use of toxic and persistent pesticides and fertilizers, and build biologically diverse agriculture.
- Cultivation Requirements:
- Organic cotton requires greater technical skills as the seed cannot be treated with pesticides.
- Organic cotton is difficult to grow in areas vulnerable to soil borne diseases.
- Mineral Nutrition of crops in organic system comes from proper management of soil organisms that are responsible for releasing nutrition.

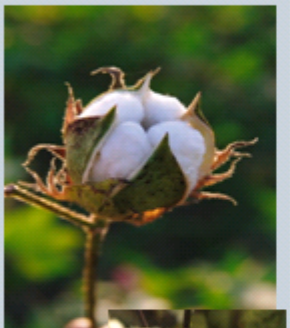
Global Organic Cotton Status.

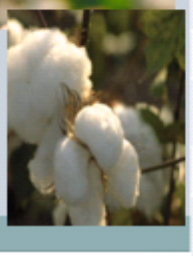
- 23 countries are involved
- India, Syria & Turkey(87% production)
- Global harvested Area 33.3 million hectares 2010-2011.
- Global Yield 754 million hectares (3% up from the previous year
- Area & Production increasing at faster rate
- From 2008 India ranks first in organic cotton production
- Turkey, Syria, China, Tanzania, United States, Uganda, Peru, Egypt and Burkina Faso.

Organic Cotton Production in India

- 80% of the production of Global Cotton from India.
- Certified organic Cereals, vegetables & animal products 25%
- India remained the top producing nation for the year 2009-2010 for the third straight year.
- The country's output for the year 2009-2010 cotton season is estimated at a record 29.2 million bales of 170 kilograms (kg) each, with cotton cultivated area totaling 10.2 million hectares and yielding 488 kg of cotton per hectare.
- Ministry of Textiles has projected that by 2012 cotton production will total 39 million bales and the yield per hectare will increase to 700 kg.

Organic Status in States &Districts.





States	Districts
M.P.	Khandwa, khargoan, indore, dhar, jhabua
Orissa	Koraput, kalahandi, Bolangir, Ganjam
Maharashtra	Yoetmal, Dhule, Amravati, Buldana
Gujarat	Kutch, Surendranagar, Gandhinagar
West Bengal	Bankura, Purulia
Tripura	North Tripura
Chhattisgarh	Durg, Raipur
Tamil Nadu	Salem, Erode, Villupuram
Andhra Pradesh	Adilabad

Status of organic seed production 2011-2012 (Pratibha Syntex Ltd)

- *We have already procured Breeder seed of elite varieties & hybrid parents from renowned institutions agricultural varieties like :*

  - *CICR Nagpur*
  - *M.P.K.V Rahuri*
  - *Marathwada Agril University*
  - *Parbhani (M.S.)*
  - *Navsari Agril University (Gujarat)*
  - *R.V.S.K.V.V. Gwalior (M.P.)*

Seed Production Registration.

- Registration of seed production of organic cotton has been completed for 2011-2012 by M.P. State Seed Corporation, Bhopal

Seed Production

Seed Production Area:

- About 15 – 20 acres of land at near Indore (M.P.) will be sown by procured different varieties & hybrid parents on trial basis during 2011 – 2012.

Seed Multiplication:

- The breeder seeds received from various research institutes/ agricultural universities will be multiplied under our technical supervision and strict inspection by the M.P. State Seed Corp. Bhopal. After certification from this agency these seeds will be distributed to organic farmers as foundation seed during 2012 – 2013 season.

Breeding For Organic Seed:

- The purity of parents of hybrid seed received from various agencies will be maintained and multiplied during 2011-2012 season. After certification these pure seeds of male and female parent will be sown under prescribed isolation of seed certificating agency. The seeds developed after crossing of male and female parents i.e. F1 seed will be distributed to the farmers by us (duly certified by certifying agency) which at present is control union.

Quality parameters of breeder seed.

- *Breeder seeds of varieties and hybrid parents procured with following specialties*

- *Better yield with higher ginning*
- *Early maturity varieties and resistance to pest*
- *MFL 26mm to 29 mm or more*
- *Strength : 22.24 PGT*
- *Micronaire: 4 - 4.5*
- *Trash: Control Below 2.5%*

Challenges In Organic Seed Production

- To convince the farmers the importance of organic farming in cotton.
- To make aware about the parameters that influence cotton yield like
  - Early Sowing Time
  - Inter crop
  - Border Crop/ Trap Crop
  - Better Use of Organic Manure
  - Crop Rotation
  - Crop Health
  - Integrated Biological Pest Management in the crop
  - Non Availability of sufficient organic manures
- Creating awareness by organizing discussion sessions, trainings and publicity about importance of organic seed production.

Conclusion

- Organic farming enhances soil structures, conserve water, mitigate climate change, and also ensures sustained biodiversity through its holistic nature organic farming integrates wild biodiversity and agro biodiversity.
- Organic farming improves farmers livelihoods.
- Organic farming has the potential for more sustainable use of natural resources.
- Organic cotton farming reduces overall vulnerability of farm house holds.
- The potential of organic farming for eradication of poverty can be further improved.


Thank you.

2.8 Experinced challenges and solutions of bioRe

R. Baruah, Director bioRe India (Ltd), Khargone District, Madhya Pradesh

Challenges & Solutions in the procurement of non GMO seeds to Organic cotton farmers at bioRe

By rajeev baruah for workshop at UASD
21st of June 2011

- Over the past years or so bioRe has been facing a major challenge in the procurement of non GMO seeds, private seeds companies (major seed suppliers) have virtually stopped the production of non GMO seeds, what is available are `old' seeds coming out of cold storages, and hence the quality and productivity of such seeds are in doubt.

Also the mutilipicty of seed brands flood the markets each year- and this has created a mind set amongst the farmers to try out new brands each year, attractive packages, catchy names are used by ***some*** of the seed companies to lure farmers.
This becomes a problem for us as we are unable to provide new brands/ varieties each year and hence some farmers drop out.

The solutions according to me are as follows:

Collaborate with State Seed Corporations to keep up the seed production of the released cotton hybrids of the state
Collaborate with seed companies to keep up the production of non GMO seeds.
Collaborate with Cotton Scientists and cotton research institutions so that the options of

Collaborate with Cotton Scientists and cotton research institutions and bring the wealth of genotypes that are there in the ***closets*** of the various stations out so that the same can be used by the farmers.

However we really need accurate data on cotton quality, from the research stations, the data must qualify if the testing is done by HVI or ICC mode, and also we need to know if the samples were from the first, second or third picking.

It is based on accurate data of the fiber properties that we can really decide what is best suited for farmers and the spinning industry.

As most of the organic farmers are in the dry and partially rain fed areas, we then need to work with the very competent breeders that we have in India and see how our Arboreums and Herbaceums can be developed further to give us the fibre properties that we need for modern spinning.

Thanks your very much.

2.9 bioRe - FiBL research activities

Dr D. Forster, Research Institute of Organic Agriculture (FiBL), Switzerland

FiBL
EXCELLENCE FOR SUSTAINABILITY

Research Institute of Organic Agriculture
Forschungsinstitut für biologischen Landbau
Institut de recherche de l'agriculture biologique

FiBL Long-term System Comparison Trials in the Tropics – The Indian Site

Dionys Forster (dionys.forster@fibl.org) 21 June 2011

Background: DOK Long-term trial Therwil (BL)

Since 1978, DOK Trial, Therwil (BL), Switzerland

- 8 treatments
- 5 crops in a 7 years' rotation
- 4 replications
- 96 plots à 100m2
- 30 year-trial

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Selected results of the DOK trial

	Organic		Conventional
Winter wheat yield	4.7 t/ha	- 15% ←	5.6 t/ha
Fertilisation (NH_4NO_3 Equivalent)	122 kg/ha	- 60% ←	360 kg/ha
Energy (Diesel Equivalent)	340 l/ha	- 30% ←	570 l/ha
Plant protection (Active Ingredients)	0-200 g/ha	- 97% ←	6.0 kg/ha
Soil fertility (Microbial Biomass)	40 t/ha	+ 60% ←	24 t/ha

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Mäder et al. (2002), Science 296

Objectives of the long-term system comparison trial

The objective is to quantify:
How organic agriculture (OA) influences

- yield and yield stability
- product quality
- product storability

How OA influences the agro-ecological system

- soil fertility
- beneficial organisms
- biodiversity

How OA influences natural and economic resource effectiveness (output/input relationships)

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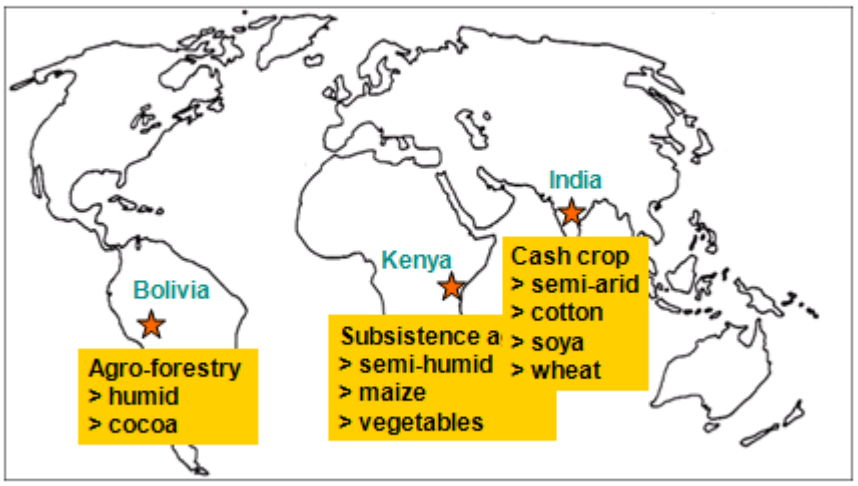
FiBL long-term system comparison trial



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Long-term experiment (LTE)

Agronomic on-station experiment

A1	A2	A3	A4
B2	B4	B1	B3
C3	C2	C4	C1
D4	D1	D3	D2

Number: Treatment
Letter: Replication

Example:
A1: Bio-dynamic Treatment
A2: Bio-organic Treatment
A3: Conventional Treatment
A4: Conventional GM Treatment

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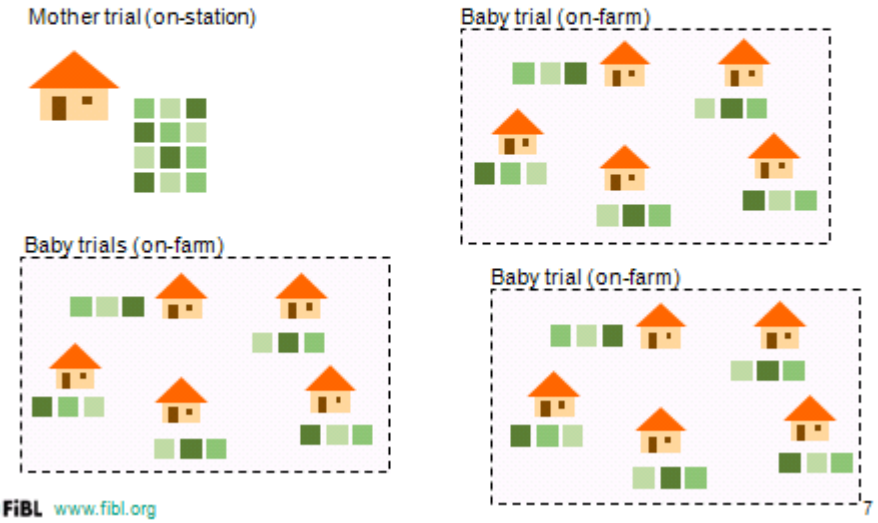
Participatory technology development (PTD)

Technology improvement for organic farmers



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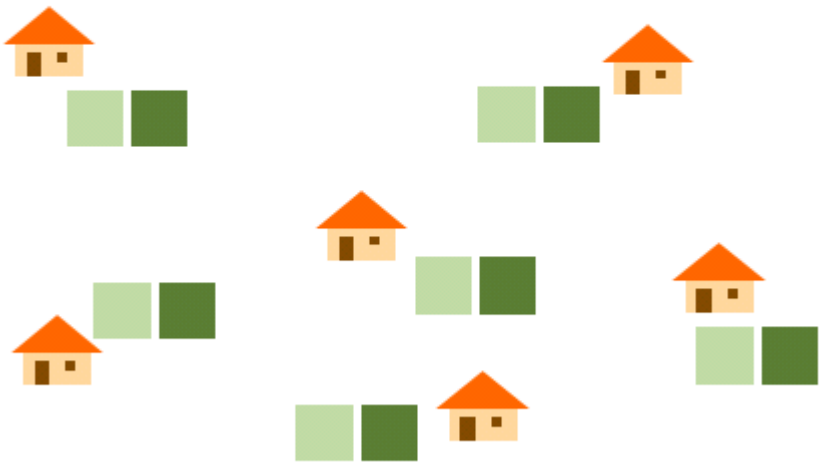
System validation

Validation of organic vs. conventional on conventional farms (India)



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Project location and trial setup

- Location: Central Indian cotton belt (Madhya Pradesh)
- Eco-zone: Semi-arid tropics
- Agricultural system: Annual fibre and food crops (cash crops)
- Crop rotation:

Year 1	Year 2	
Cotton	Soya	Wheat

- Treatments: (1) Biodynamic, (2) organic, (3) conventional and (4) GM-cotton
- Trial start: May 2007
- Partners: bioRe India Association

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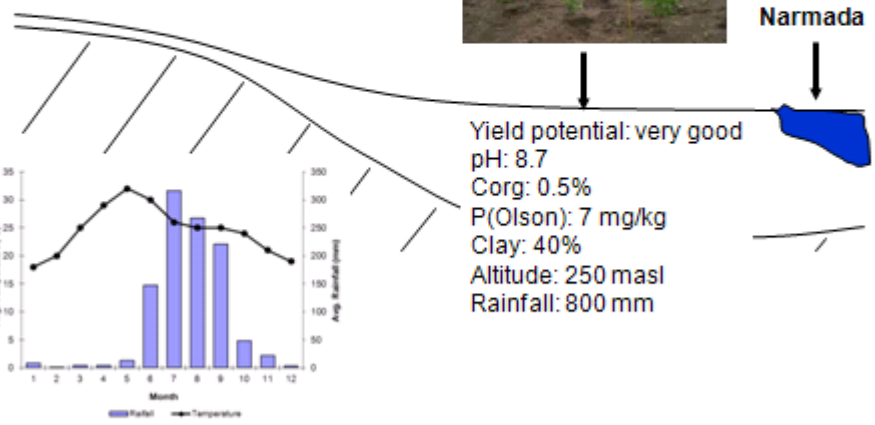
India: Trial site



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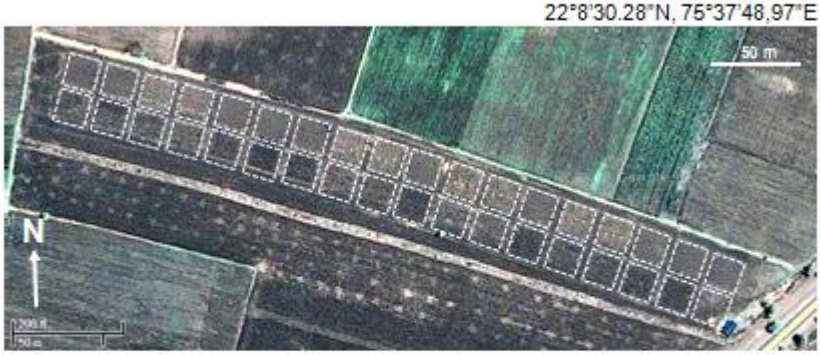
Long-term field trial

22°8'30.28"N, 75°37'48.97"E



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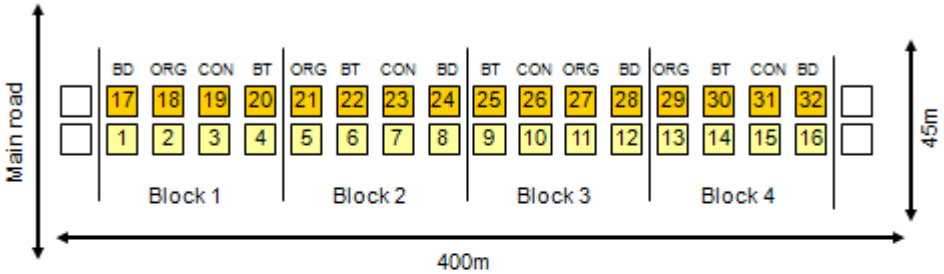
Trial design 1st rotation year



Soya-Wheat

Cotton

bioRe Association India
Training Centre

N

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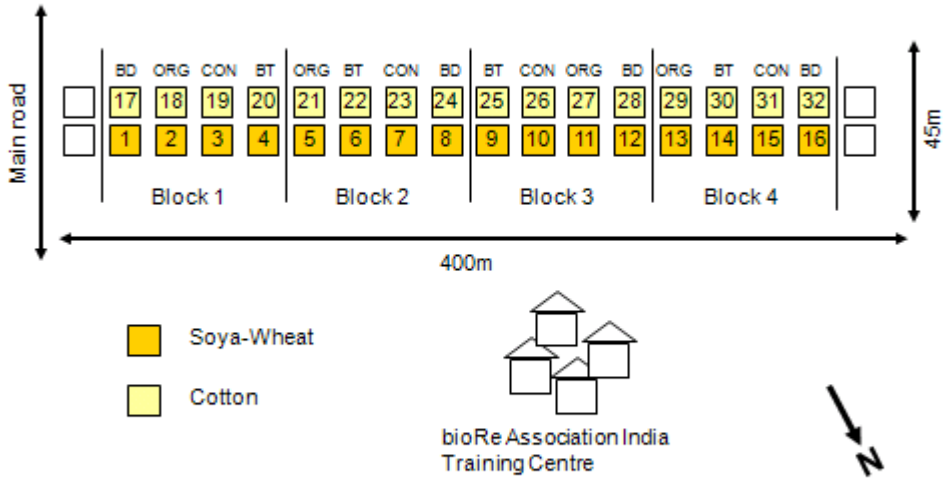
Trial design 2nd rotation year



Nutrient application and parameters collected

Fertiliser application

	Conventional & GM	Biodynamic & Organic
Synthetic fertilisers	80% of N 80% of P	None
Organic fertilisers	20% of N 20% of P	100% of N 100% of P
Total N and P	As officially recommended and practised by farmers of the area	Approx. 50% of CONV / GM

Parameter

- Agronomic parameter (e.g. yield)
- Soil physical, chemical and biological parameters
- Economic parameters (e.g. gross margins)

Preliminary cotton results 2009/10

- ORG and BD cotton were similar to CONV cotton, but GM cotton yielded almost 50% more
- Production costs in ORG and BD plots were on average about 30% lower compared to CONV and GM plots
- Without premium price, the gross margins in ORG and BD plots were on average about 9% higher than for average CONV and GM plots
- With premium price, the gross margins in ORG and BD plots were on average about 30% higher than for average CONV and GM plots

Preliminary soybean results 2009/10

- ORG and BD soybean yields were between 13 to 18% lower than CONV soybean
- Soybean yields on GM plots were slightly higher than on CONV plots.
- Production cost in ORG and BD plots were about 60% of the costs in CONV and GM plots
- Gross margins of ORG and BD plots were on average about 10% lower then on CONV and GM plots

Preliminary wheat results 2009/10

- Wheat yields were similar for ORG, BD and CONV plots
- On GM plots, wheat yield was slightly higher, probably due to higher residual N
- Production costs in ORG and BD plots were about 30% lower than in CONV and GM plots
- Gross margin in ORG and BD plots were about 20% higher than in CONV and GM plots

PhD project on nitrogen and water dynamics

- Rational: Sufficient nitrogen supply is often critical in organic farming
- Objectives:
  - To investigate N availability and use efficiencies across different seasons in organic vs. conventional production systems
  - To assess the effect of soil moisture availability on previous process
  - To define and test alternative practices for improving N use efficiency (N-UE) in the different systems
  - To model N and water dynamics (net N mineralization, plant N uptake, N leaching, evapotranspiration, water drainage) in each system
- Start: 1 May 2011

PhD cand. Olivier Duboc

Field preparation with draught animals

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Application of compost

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Wheat and cotton on the trial field

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Wheat harvest

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Harvested soybeans in LTE

Threshing soybeans in LTE

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Flooded fields during monsoon in July 2007 and August 2009

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PTD Topics

Trial Type	Crop	Mother trial	Baby trial	Demo Plot
Cultivar screening	Cotton	X		X
Phosphate rock	Cotton, Soybean, Wheat, Mung bean, Maize	X	X	
Leguminous green manure crops	Sesbania, Crotalaria, Gliricidia	X		X

PTD Rock Phosphate trial on-station (Mother Trial)

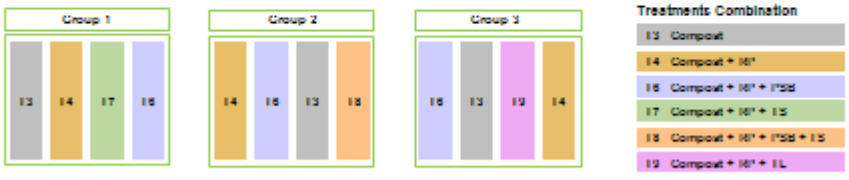
- Objective: To evaluate the effect of different rock phosphate treatments on various crops → develop best practices → increase nutrient use efficiency
- Treatments:
  - T1) Soil alone
  - T2) Rock phosphate alone
  - T3) Compost alone (4 t/ac)
  - T4) Compost with rock phosphate (100 % P_2O_5)
  - T5) Compost with rock phosphate (200 % P_2O_5)
  - T6) Compost with rock phosphate, treated with Phosphorus Solubilising Bacteria (PSB)
  - T7) Compost with rock phosphate, treated with Tamarind Solution (TS)
  - T8) Compost with rock phosphate, treated with PSB + TS
  - T9) Compost with rock phosphate, treated with Tamarind leaves
- Block size: 16 x 11 m; plot size: 5 x 3.5 m
- Randomized complete block design (RCBD) with 4 replications

Mung bean trial 2011

Maize trial 2011

PTD Rock posphate trial on-farm (Baby Trials)

- Treatments: Similar to on-station experiment
- Treatment combination:
  - T3-T4-T6-T9
  - T3-T4-T7-T9
  - T3-T4-T8-T9
- Baby trials (on-farm) in 4 villages, 39 farmers, 3 groups



- Randomized allocation (Plot size 50 m2)

Participatory technology development (PTD) meeting

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Evaluating wheat yields in the rock phosphate trial

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PTD on phosphate rock

Discussing wheat grain quality

PTD Topics

Trial Type	Crop	Mother trial	Baby trial	Demo Plot
Cultivar screening	Cotton	X		X
Rock Phosphate	Cotton, Soybean, Wheat, Mung bean, Maize	X	X	
Leguminous green manure crops	Sesbania, Crotalaria, Gliricidia	X		X

Green manure trial on-station (Mother Trial)

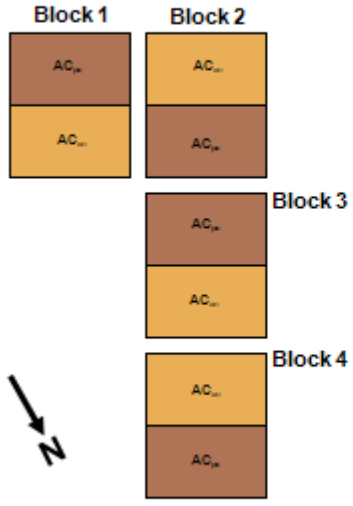
- Objective: To explore different annual and perennial alley cropping systems on-station and on-farm.
- Treatments:

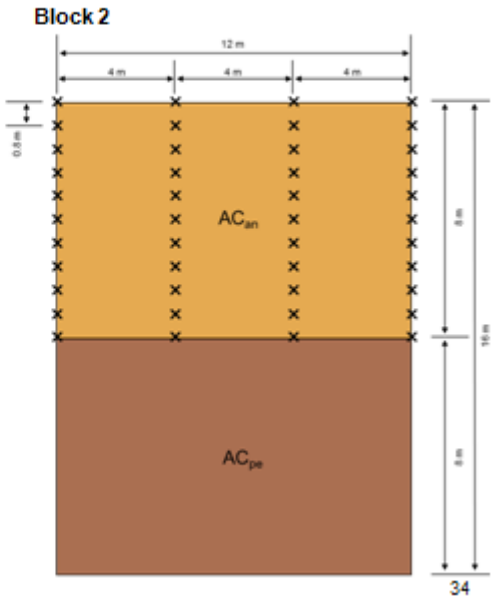
  AC_{an}: Annual alley cropping system with pigeon pie and chilli

  AC_{pe}: Perennial alley cropping system with (*Gliricidia* and *Leucaena*)

  Annual crop rotation cotton – soybean – wheat
- Block size: 16 x 12 m; plot size: 12 x 8 m
- Randomized complete block design (RCBD) with 4 replications

Alley cropping trial design



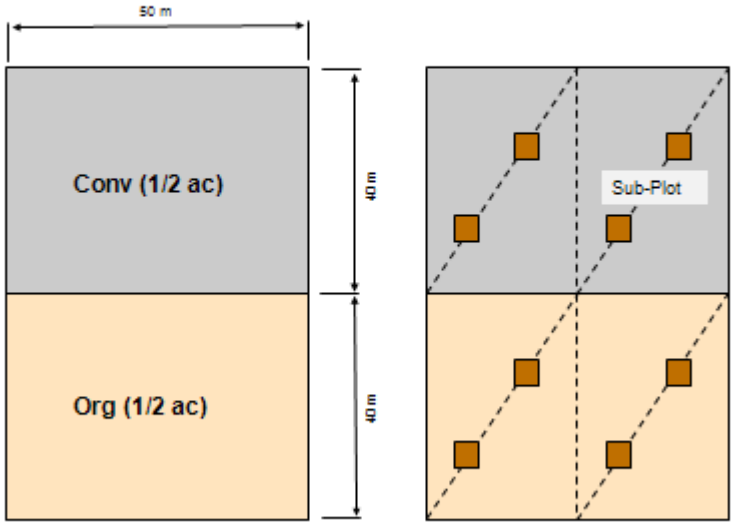


Green manure alley cropping trial with *Leucaena* and *Gliricidia*

Validation trial

- Objective: To validate organic and conventional production systems under farm conditions.
- Treatments:
  - A: Compost alone (4 t/ac, organic repellents)
  - B: Farmer's practice (usually FYM + NPK, synthetic pesticides)
  - Annual crop rotation cotton – soybean – wheat
- Field size: 1 ac; plot size: 0.5 ac, subplot size 3 x 3 (soybean and wheat) and 7 x 7 (cotton).

Validation trial design



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Young H12 cotton variety in a validation trial

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Validation trial – Threshing of Soybeans

Separation of yield

bioRe research team


Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Swiss Agency for Development and Cooperation SDC
coop
Sustainability fund
LED LIECHTENSTEIN DEVELOPMENT SERVICE
BIOVISION
Thank you for your attention!
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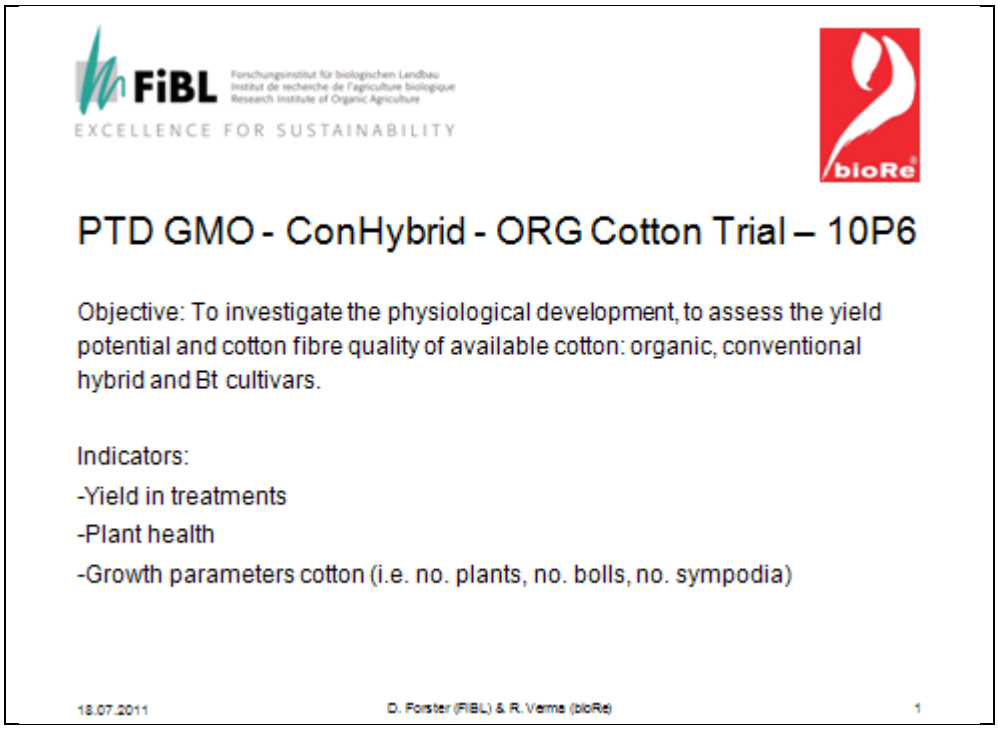
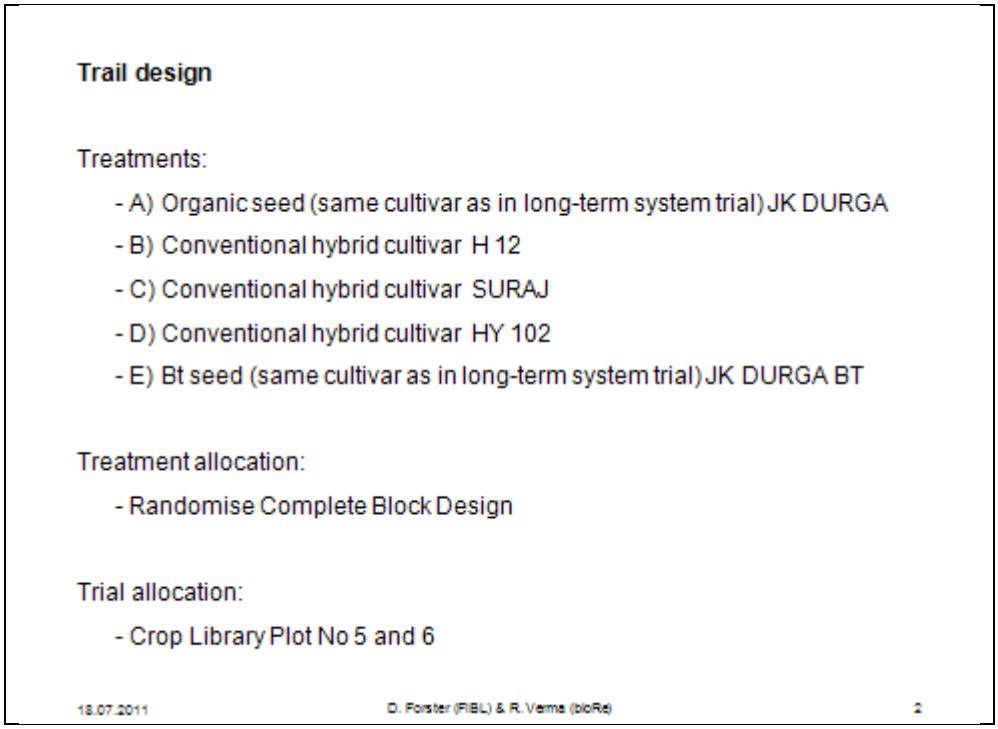
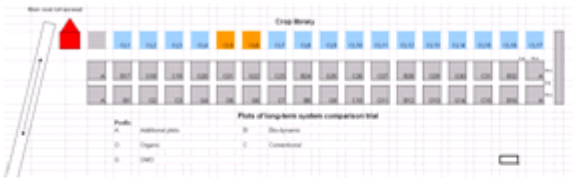
2.10 bioRe - Cotton screening (on-station, on-farm)

R. Verma, Research Manager bioRe India Association, Khargone District, Madhya Pradesh

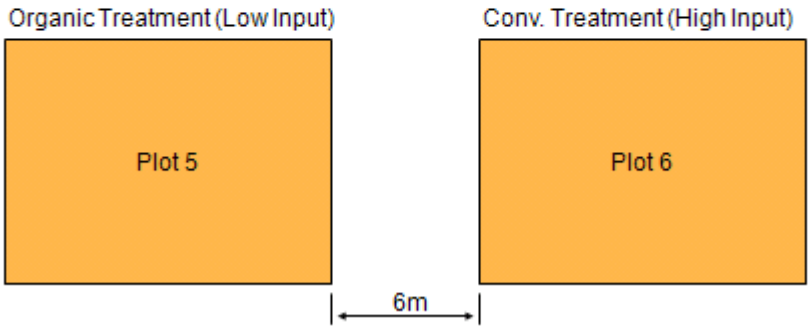




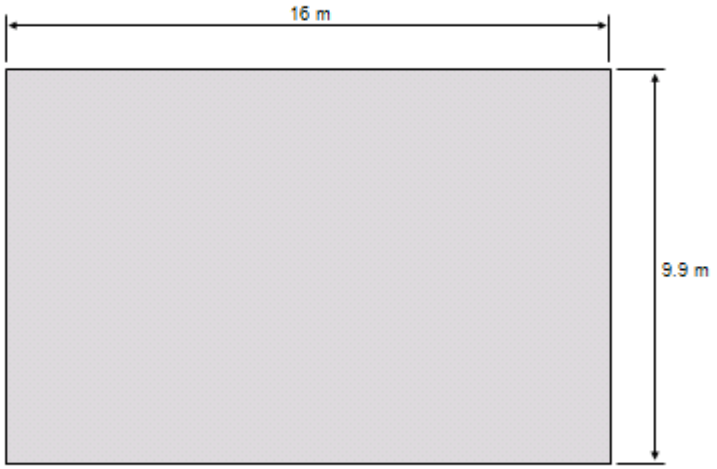
Crop Library plots



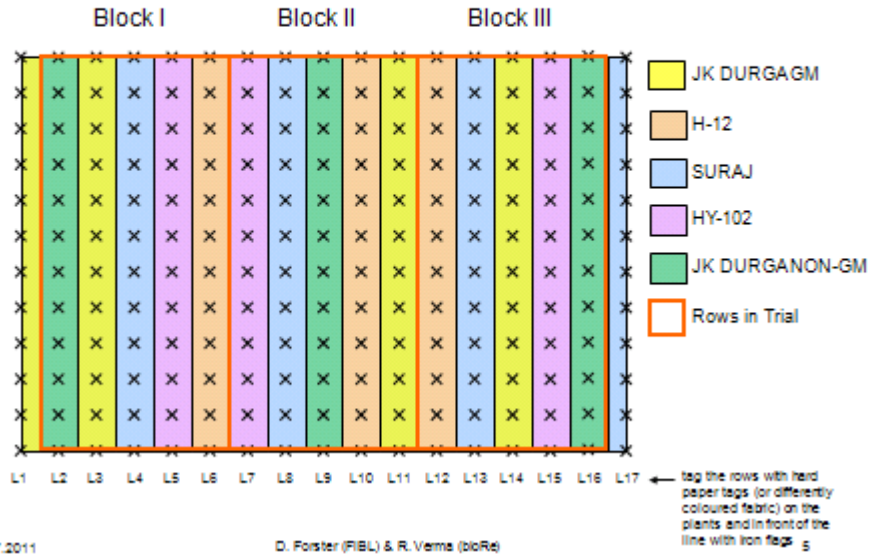
C21 opposite to CL5: Organic
C22 opposite to CL6: GMO



Crop Library Plot



Plot A – low input (PlotNo 5)



Design Parameters:

-	Plot size	158.4 m2
-	No. of plots/ field	2
-	No. of treatment levels	2

Plant Spacing:

- Planting spacing: 1 m x 0.9 m (row spacing 1 m; intra-row distance 0.9 m)
- 12 plants in each row.

Seed Treatment:

- Plot 1: Biogas slurry + Neem leaf extract
- Plot 2: Imidachloropede 70% SL (Gaucho) @ 3ml/kg seeds. Do only treat organic seed

Fertiliser:

- Plot 1: 8500 kg compost/acre → 336 kg compost/ plot
- Plot 2: 2500 kg compost/acre → 99 kg compost/ plot
  125 kg urea/acre → 4.9 kg urea/ plot
  210 kg SSP/ acre → 8.3 kg SSP/ plot
  65 kg MOP/ acre → 2.6 kg MOP/ plot

Field Preparation:

- Ploughing, harrowing, levelling as for plots in big trial
- Sow one seeds per location based on seed germination test in seeing plates
- Thin after 30 and 50 DAS to 1 plant

Plant Protection:

- Plot 1: Neem + cow urine spray at 15 days interval, Garlic-onion-chili repellent, Top-ten spray
- Plot 2: Pesticide + Fungicide

Parameters collected

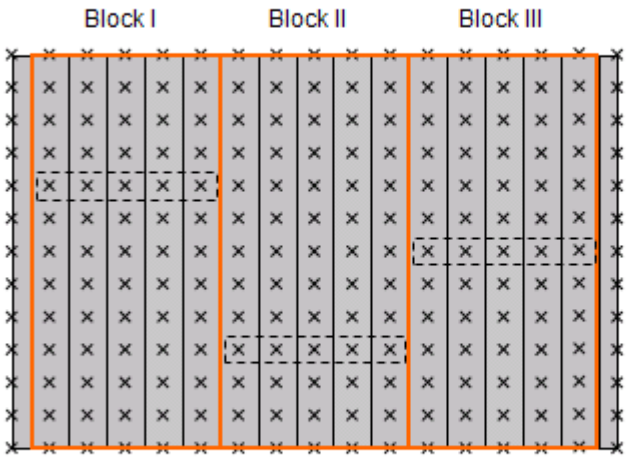
- Plant health
  - Pests (feeding damage, point system)
  - Diseases (coloured leaves, necroses)

- Growth parameters Cotton
  - Stem diameter
  - Monopodia/ Sympodia
  - No sympodia
  - Plant height
  - No pin head (at time X)
  - No of flowers and colour at 1st, 2nd, 3rd, ... picking)
  - No open balls (1st, 2nd, 3rd,... picking)
  - No closed balls (1st, 2nd, 3rd,... picking)
  - No harvested balls (1st, 2nd, 3rd,... picking)
  - Yield per row (1st, 2nd, 3rd,... picking)

Parameters to be collected (cont.)

- Cotton fibre quality
  - Sample weight
  - Seed weight
  - Lint weight
  - Seed index
  - Staple length
  - Fibre fineness
- Photo monitoring
  - 1 randomly selected line in low input level
  - 1 randomly selected line in high input level

Photo monitoring Plot No 6



1 randomly selected line per block

The plants should be tagged with small hard paper tags. Photos should be taken every month (start with DAS 0).

SURAJ

Low Input

High Input

H-12

Low Input

High Input

HY-102

Low Input

High Input

JK DURGA

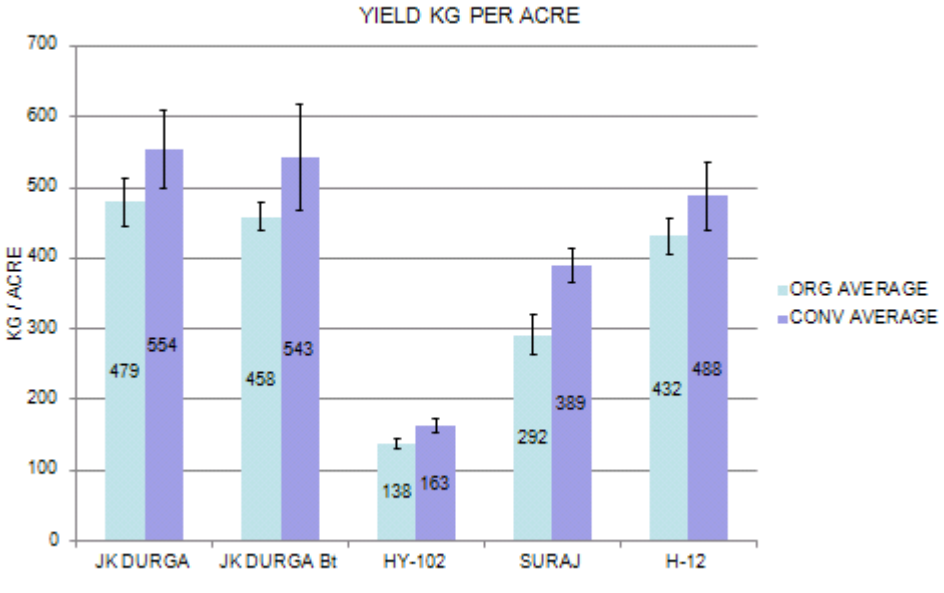
Low Input

High Input

JK DURGA BT

Low Input

High Input

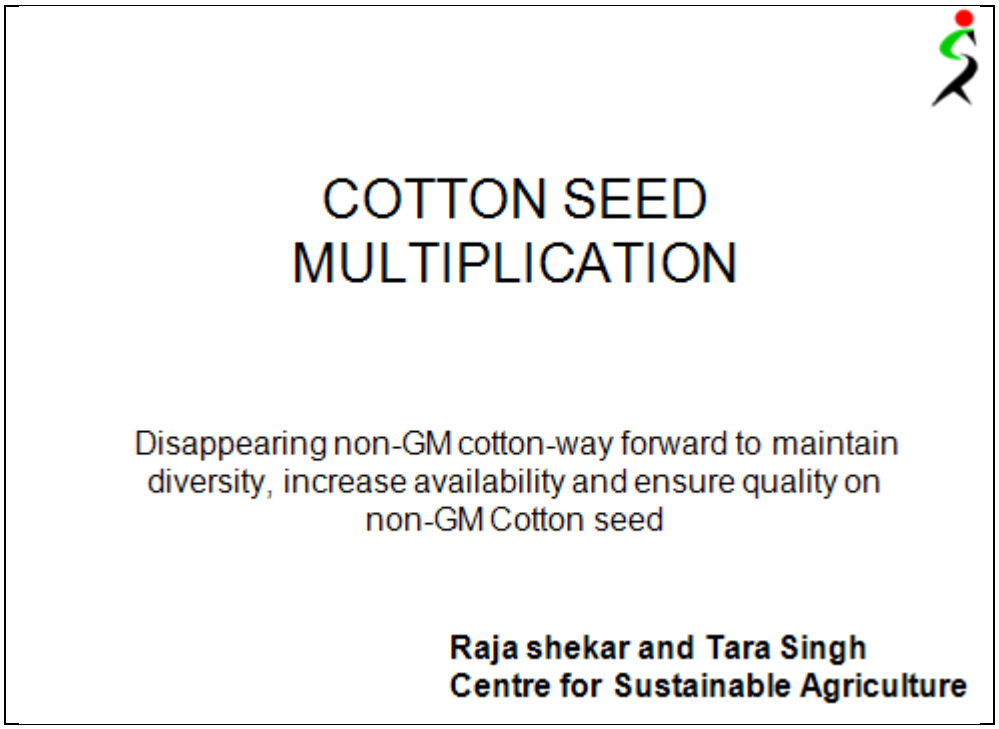


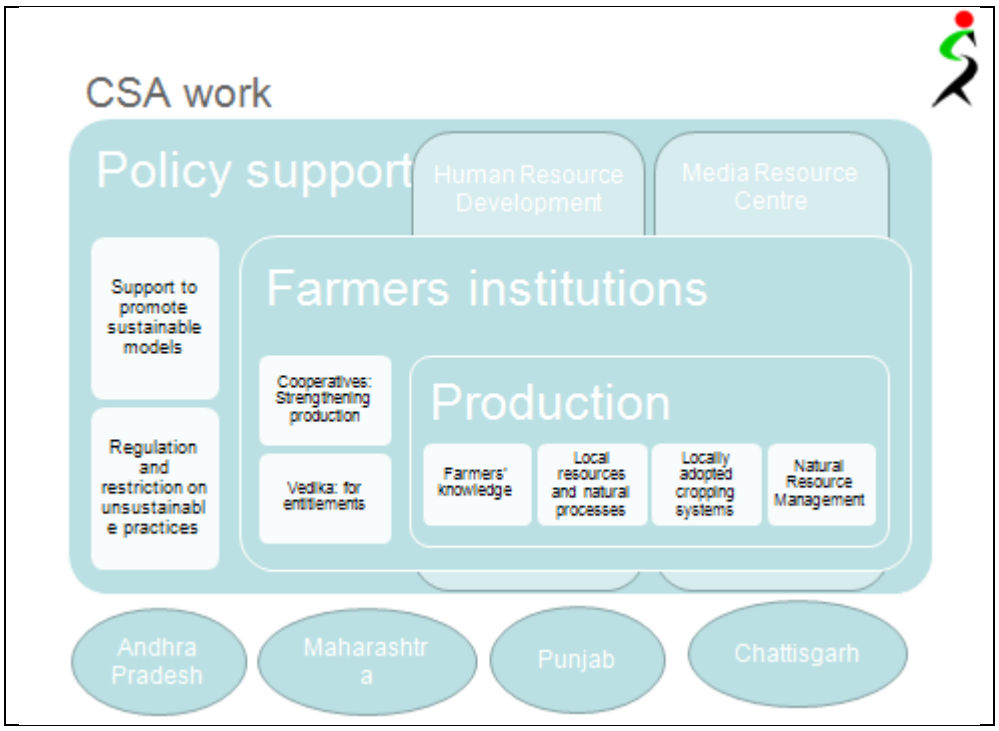
Conclusion

- Cultivars performed slightly better under conventional treatment.
- JK Durga & H-12 both achieved higher yield than the Suraj & Hy-102.
- Overall JK Durga performed best.
- JK Durga non-GM performed better than JK Durga GM in both low input & high input treatments.
- Selection of JK Durga for long-term experiment, cropping season 2011-12.

2.11 Cotton Seed Multiplication

Raja Shekar and Tara Singh, Centre for Sustainable Agriculture, Hyderabad, Andra Pradesh





Cotton farmers: Current scenario

Caught in a debt trap

- High input costs
- Uncertain inputs
- Uncertain market prices

Linked to farmers suicides

- 1987 prakasham, guntur dist. > 100 farmers committed suicides, several migrated
- 1997 warangal, karimnagar dist > 750 farmers committed suicides
- 2004 all over the state >1500 farmers committed suicides ..this time not just cotton farmers

Cotton contaminated

- Contamination with GM
  - Genetic contamination (5-15 %)
  - Physical mixture (5-30 %)
- Implications
  - Loss of biodiversity
  - IPR implications
  - Market implications

Reasons for contamination

- transgenes flow with normal reproductive processes
- move when a plant carrying a transgene moves to a new environment, via seeds or propagules
- possibility of contamination in the physical handling and human-mediated processes (admixtures)
- Scale issues affect estimates of pollen-mediated gene flow

Photos:
On the top left, a seed producer in Gujarat who is growing non-Bt Cotton seed on the right and Bt Cotton seed on the left, with no isolation distance at all; Top Right – a farmer in Andhra Pradesh, with distance between seed production plot and commercial Bt Cotton plot of two different companies being just around 4-5 feet. Left – no isolation distance between two different seed production plots, Andhra Pradesh

HOMEBRED COTTON

- Initiated in the year 2004-05 in Warangal and Khammam dist. AP.
- Male and Female lines were evolved by participatory plant breeding from public sector var. –Narasimha , BN-1 and N-1,NHH 44
- In the year 2007, male and female lines were stabilized
- F1 production was initiated in 2008

Yenabavi Female and male

RC purma female and male

Yenabavi homebred

Rainfed condition

No. of bolls/plant	: 26.9
Boll wt (g)	: 3.8
Staple length	: 26mm - 28 mm
Space	: 40 X 28 inches
Yield	: 6.5 q/acre

Irrigated condition
YB-2

No. of bolls/plant	: 50.1
Boll wt (g)	: 4.9
Yield	: 9.3 q/acre

RC Puram homebred (2009)

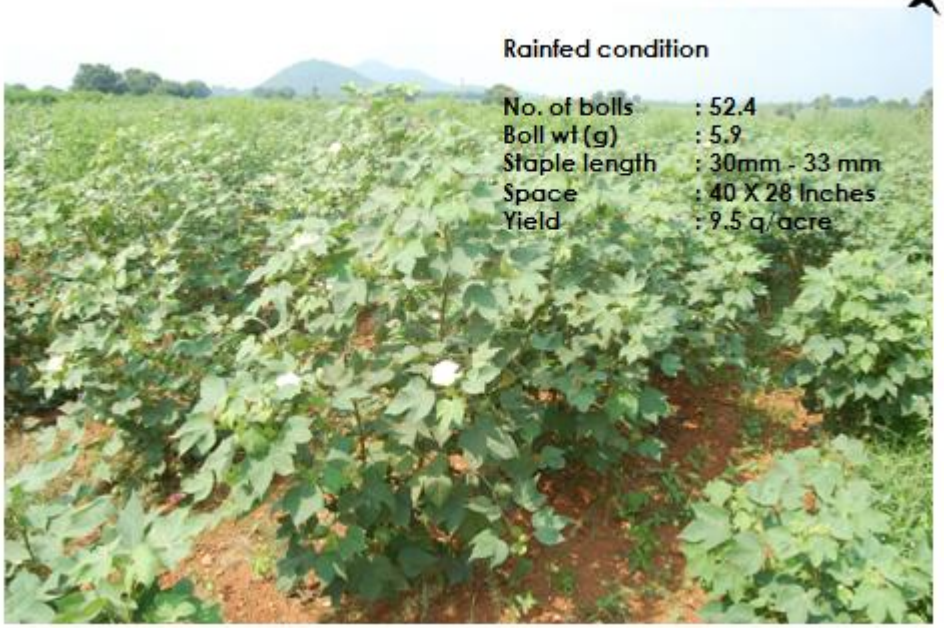


Table 7: Hybrid cotton seed production 2010

S.No	NGO/Dist.	Name of the Hybrid	Area
1	MARI-Warangal	RC puram Hyb.	2 Cents
2	CROPS	RC puram hyb	3 Cents
3	SECURE-Khammam	RC puram hyb	10 Cents
4	PSS-Warangal	Ebnabavi hyb.	30 cents
5	Zameen organic- Adilabad	RC puram	50 cent
		NHH 44	3 cents
6	Chetan organic-Orissa	RC puram hyb.	20 cents
		Enabavi	05 Cents
		NHH 44	2 cents
		Total	1.15 Ac

From 1.15 Ac, we have produced around 300 packets of F1 @ 450 gms each
Kharif 2011- F1 cotton seed production was taken in 5 Ac.

sowing

Emasculation and crossing

Yenabavi F1

Selfing to maintain male and female lines




Further details

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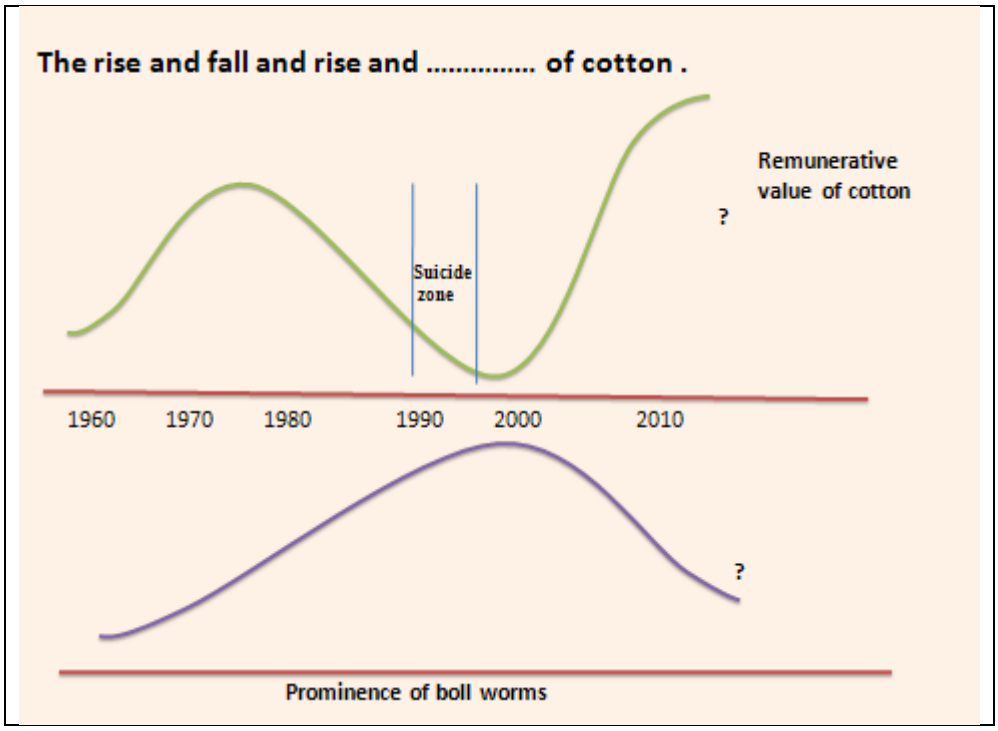
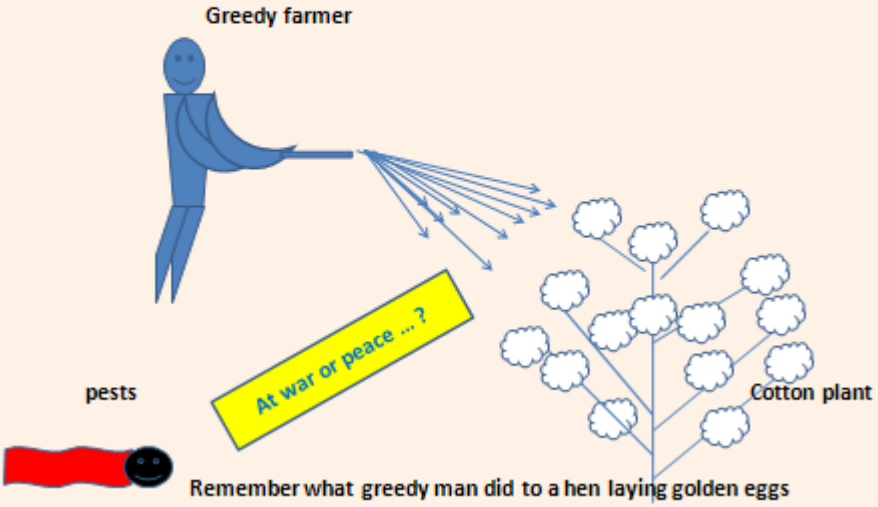
The learnings are from the projects supported by
Hivos, Netherlands
ASW, Germany

2.12 Perspectives and outlook for India's non-GM cotton in future

Dr S.S. Patil, Senior cotton breeder ARS Dharwad Farm Dharwad, UAS Dharwad, Karnataka



Intensive conventional cotton cultivation



Remember what greedy man did to a hen laying golden eggs
Organic farming is about having one golden egg a day

Problems have arisen with Hirsutum based cottons

However , the greed for higher income involving over exploitation of hirsutum and barbadense based cotton genotypes has led to this unhealthy situation of rise and fall of the remunerative value of cotton.

Maintaining stable equilibrium of pests, predators and cotton ;
No war but peace in the Eco system

- It is necessary to soften the ecosystem and purify from presence of harsh chemicals - Intum the hostile strains of pests – cotton cultivation system with the optimum expectations (not greed for very high income) of remuneration from cotton.
- Harmonious co- existence of cotton plant ,farmer, pests and predators
- Message needs to be communicated to farmers, policy makers politicians
- They have to be educated about these through training programs, seminars etc.,.

Shift in the species composition of cotton :Promotion of Desi Cottons

Desi cottons where prominently grown at the time of independence (97%)

by 1990's this proportion was reduced to 28 (%) and

Now in 2010 less than 10 %,

Decline in demand for non GM varieties and hybrids

Desi cotton Eco-system

Desi cottons are inherently tolerant to both biotic and abiotic stresses, because of these species are grown with minimum chemical intervention in the ecosystem almost organic

Remunerative value has never declined and no reports of suicides .

Non GM cotton : what is grown where ?

Desi cottons		
Herbaceum	Jayadhar, Renuka RAHS-14 DDHC-11	Karnataka
	G cot series	Gujarat
Arboreum	AK235,DLSA-17	Karnataka
	AK235	Maharashtra
Hirsutum	LRA 5166,Sahana,RAH-100	Summer cotton belts of Karnataka
	LRA5166 and Surabhi	Sundarban (Westbengal)
H x H Hybrids	Some Private And Public Sector and other hybrids	Organic cotton fields of different states
Barbadense	Suvin	Parts of Tamilnadu Karnataka on contract basis mostly on non-organic situation.
H x B hybrids	DCH-32, Varalakshmi and Others	Parts of south Karnataka and Madhya Pradesh

Tale of the transition Phase from Non Bt to Bt Cotton

- The switch over from Non Bt to Bt was very quick
- Some leading Non-Bt hybrid seeds brands and State Seed Corporations could not liquidate seed stocks due to the fast declining demand for Bt cottons and this even lead to financial losses.
- These stocks could find Lucky usage as Refugea
- Even exchange of these hybrid seeds between companies for fulfilling requirement of Non Bt seeds
- **At Present** any cotton genotypes (variety or hybrids) is permitted to be used as Refugea and soon redgram is being considered as alternative to this

Present Perception of Private Sector

- There is limited scope for non Bt hybrids.
- Minimized focus on the usage of non Bt lines in their research programme.
- Programme on developing conventional mechanism of tolerance to bollworms are shelved.
- The present cultivated Bt hybrids may have one non Bt and another Bt parent.
- We may foresee a situation where more and more released hybrids have both Bt parents.
- Most seed companies do not want to continue developing non Bt cotton varieties and hybrids ?
- Can we say this is causing Erosion ????

Shrinking seed source of non- GM cotton

➢ Cost of hybrid seed production increasing private sector is not interested in producing even state Seed corporation are disowning their social responsibility of producing non GM cotton seeds of even desi cotton varieties required by poor farmers for rainfed eco system

Increasing Cost of HYBRID Seed

- Hybrid seed production cost is increasing.
- Seed production farmers insisting on Bt gene in parents so that seed production Cost is minimized.
- Recently revision of sale prices of Bt cotton seeds was approved in different Indian states.
- **No Takers of non-Bt cotton hybrid seed production**

Seed cost of non Bt cotton expected hybrid seeds production expected to be higher than Bt cotton hybrids.

Organic cotton groups should help themselves

- Should develop their own source of hybrid seed production and acquire Self sufficiency for hybrid seed need .
- Backyard seed production family members also can spare time to produce hybrid seeds
- Farmer is self responsible for purity of hybrid seeds
- No scope for exploitation
- Some private sector companies are interested in producing required quantity of Non-Bt cottons.

Undesirable(?) Features of Successful Bt Cotton hybrids

❖ Reduction in emphasis on conventional mechanism of resistance to boll warms such as Tolerance, Antibiosis and Non-preference

❖ **This is the kind of Erosion seen with in Hirsutum species**

❖ If in future the Bt genes fails to function the cotton crop will be so ill equipped in handling bollworms

❖ Very important to maintain and promote non Bt and organic cotton cultivation. Promotion of non Bt cottons in organic situation helps in saving ecosystem from usage of harsh chemicals, Purify ecosystem **helps in encouraging genetic source of conventional resistance to bollworms and maintain genetic diversity and prevent genetic erosion**

❖ Bt gene induced mismatch between source and sink lead to reduction in yield and harvest index in upper half, reduction in rejuvenating capacity in many hybrids. Hence increased photosynthetic ability, stay green nature become all the more important in genotypes utilized for breeding or Bt cotton

Variety v/s hybrids in Organic Situation

- Hybrids reveals high heterosis and vigour. Hybrids are more productive varieties.
- Varieties can also be improved thereby leading to increase in their genetic control (yielding ability) Bringing them closure in potentiality to hybrids.
- Lost of varietal seeds will be negligible as compared to hybrids (Rs 20 vs Rs 2000/Kg)
- This saving matters all the more especially in marginal soils dry land situation, saline situation etc and also incase of poor farmers.
- Farmers can multiply his own seeds under some simple guidance from breeders

- Varieties are thus a long term solution especially in less productive situation

Situation	Cost of seed			
	Per se		Per cent of cost of cultivation	
	Variety	Hybrid	Variety	Hybrid
intensive	Low	High	Low	High
marginal	low	high	low	Extremely high

- In Indian situation private sectors breeder have minimized the usage of non- Bt lines in their Working germplasm involved in hybrid research

- Public sector breeders are producing non Bt hybrids available in the market

- In our trials every year 20-30 non Bt hybrids > Bt check hybrids in artificially protected situation This confirms the genetic potentiality of the material available with the public sector breeders

- **Interest of private seed industry**

Bt cotton	India	Abroad	Role of public sector
Variety Bt	no	yes	yes
Hybrid Bt	Slowly becoming difficult and cost is increasing	Not feasible Hybrid seed production is not viable	
Non- Bt cotton			
variety	no	--	yes
hybrids	Very limited interest	Very limited interest	yes

✓ In developed countries regulations are strict and the system of royalty flowing to the seed company encourages the seed industry to release variety and the farmers returns to buy the seed every year.

✓ In India, companies fear that he will not come back again for seed….

How can The trend of genetic erosion : can we reverse it ?

➢ The trend of decline in focus on conventional mechanism of boll worm tolerance leads to genetic erosion

➢ A successful genotype in non-Bt ecosystem has to posses strong conventional mechanism of resistance.

➢ Breeding genotypes for this situation will enrich the germplasm with bollworm resistance genotype, it should have been lost other wise……

➢ Presently there is **free usage of chemical pesticides in the ecosystem in which we breeders are developing potential non-Bt cotton** varieties. There again **focus** on conventional mechanism of resistance is **lost**.

Scope for enhancing ELS cotton production

- Price of ELS cotton is increasing
- International market demand will continue to increase
- Earlier there was problem of low productivity of Suvin
- Now many new **barbadense varietal lines** are available which are improved in productivity and fibre quality
- Organic farmers are demanding DCH 32 seeds while we have dozens of hybrids distinctly better than DCH32 and even best Bt cotton hybrid
- Need for testing them across locations representing organic cultivation and ensure that genotypes are identified exclusively

Increase in labour cost has its impact on the cost of cultivation

- It has necessitated high density planting and use of machines for picking cotton
- Compact early maturing varieties are the best choice for this situation
- This can facilitate and promote double cropping in cotton ecosystem.
- Public sector can play important role in developing non-GM compact varieties of cotton.

Contamination by Bt cotton

- Non Bt material is surrounded by Bt cotton, cross pollination takes place to an extent of 20 % It can be still higher when people activity moving in research plots containing Bt and Non- Bt in adjoining plots.
- Many of the varietal genotypes are heavily contaminated.
- For a breeder developing a non Bt cotton, It is a bigger problem in handling population after hybridization While practicing selection of potential plants contaminated Bt cotton plants are attractive and more productive
- Before realizing this mistake, lot of potential non Bt plants would have been rejected.

Maximum care should be taken to prevent this while

a) Maintaining and multiplying a variety
b) Practicing selection and developing new varietal lines.

How do we Develop Varieties exclusively for organic situation

- Farmers participatory development of cotton varieties for organic situation
- Development of Self sufficiency for seed needs
- Even hybrid seed production can be taken up at farmers level

Present Methods of testing and release of Cotton varieties/Hybrids

- Present system prevailing for identifying genotypes for irrigated and rainfed situations in different cotton zones in ICAR system
- Releasing varieties at state level based on multi location trials and testing of genotypes
- There is a need to introduce new trials of testing cotton genotypes in ICAR system for Indian organic belts
- Existing organic farmers fields, testing farms of NGOs cotton research stations of SAUs and central cotton institutes can be used for testing cotton genotypes

3 Dharwad Declaration 21th June 2011

Disappearing non-GM cotton – ways forward to maintain diversity, increase availability and ensure quality of non-GM cotton seed

This declaration is made at the national workshop on 'Disappearing non-GM cotton – ways forward to maintain diversity, increase availability and ensure quality of non-GM cotton seed', organised by bioRe India (Ltd), the Research Institute of Organic Agriculture (FiBL Switzerland) the University of Agricultural Sciences Dharwad (UASD) and supported by other stakeholders. Scientific guidance was given by Dr. S. S. Patil and his team (UASD) who have many years of experience and an outstanding reputation in cotton breeding.

Cotton, a cash crop of India's rural economy is livelihood of about four million farmers. The adjacent textile industry employs another three million persons. In 2008, India has become the second largest cotton producer just after China. While seed cotton yield levels were rather modest (270 kg/ha) after independence, they steadily increased and reach on average up to 1820 kg/ha. The success of cotton improvement can mainly be associated to the coordinated efforts of farmers, breeders, agronomists, entomologists, pathologists and physiologists. Their commitments lead to the release of the world's first intra-specific Gossypium hirsutum hybrid cotton (HYBRID-4) in 1971. Besides indigenous Desi cotton varieties are native to India and provide sought-after characteristics such as hardiness, pest resistance and drought tolerance. Despite, this area under Desi cotton is fast declining. Nowadays Indian farmers grow 90% hirsutum, mainly hybrids, of which 90% is GM cotton. Thus, Desi cotton will only survive if yields and fibre quality will improve and the maturity period reduced. During the last two decades organic cotton production has gained increasing interest worldwide, but especially in India. The country has become the world's largest organic cotton producer. Up to 80% of world's organic cotton is reported to be produced in India. Also the global market for organic cotton products increased from 1.97 to 4.3 billion USD in 2007 and 2009, respectively. However, this market is threatened by the erosion of conventional varieties by GM cotton. Since the market for non-GM seed has become completely eroded, there is little interest by private seed companies to further invest in this sector. On the other hand, farmers have lost their traditional knowledge on seed production. Hybrid seeds have to be purchased each season and therefore cotton farmers depend today on a diminishing supply of non-GM cotton seed. Recent experience has been that available non-GM seeds has dubious quality (expired, chemically pre-treated, segregated) and based on only a few hybrids selected for responsiveness to fertilizer and chemical pest control that might not be adapted to their rain-fed, low input conditions. Moreover, there is a big risk of physical and genetic contamination of organic cotton with GM cotton and the loss of locally adapted genetic resources.

Breeding cotton varieties and hybrids to suit different agro-ecological regions and providing quality cotton to meet the needs of the cotton sector has always been the priority of cotton breeders in India. The University of Agricultural Sciences, Dharwad has been a pioneering institute involved in developing cotton varieties and hybrids for over a century. The university has thus some of the best Indian cotton breeders and the greatest cotton germplasm bank in India. The disappearance of non-GM cotton in India and the awareness for genetic erosion convinced concerned stakeholders of the organic movement to give high priority to this issue.

The participants jointly declare that immediate action is needed to improve seed availability, seed access and seed quality of non-GM cotton varieties adapted to organic and low input conditions. In particular we support activities in the following areas:

Collaboration and exchange:

- Gathering and facilitating exchange of information, techniques and genetic material among stakeholders;
- Pooling volume of producers seed demand and try to attract public and private cotton seed companies and organize an annual meeting to update on seed quantity needs;
- Promoting public-private partnerships for non-GM cotton and the active involvement and collaboration of public cotton research, pre-breeding, breeding and multiplication with organic cotton producers, processors and private seed companies;
- Forming a forum consisting of project heads, NGOs, farmer groups and other stakeholder to do policy advocacy.

Desired Policy Changes:

- Focusing policy and public research on conservation, multiplication and breeding of non-GM seed;
- Installing a board for organic cotton with financial and implementation powers;
- Continuing dialogue with policy makers;
- The provision for the safe guard of organic farmer from contamination of GM crop has to be included in the seed act;
- Declare ecologically sensitive zones (i.e. around national parks) GM-free.

Evaluation and multiplication of existing cotton varieties under organic and low input conditions:

- Local testing and multiplication of existing non-GM cotton varieties on-station and on-farm under various conditions;
- Maintaining and utilising of genetic diversity of non-GM germplasm in situ, especially of Desi cotton, to be prepared for future challenges of climate change.

Establishing and optimizing the non-GM cotton seed value chain:

- Implementing stringent preventive measures to avoid physical and genetic GM contamination;
- Identifying specific non-GM areas for seed production;
- Installing seed quality testing that can be implemented by farmers organizations, including test for GM contamination;
- Establishing seed data base on availability of seeds and results from variety trials, especially fibre traits under different growing conditions;
- Training farmers in seed multiplication, processing and storage;
- Empowering farmers and farmer groups to set up own seed business;
- Bringing valuable germplasm of public institutions to farmers' fields.

Continuous improvement of non-GM varieties:

- Breeding non-GM cotton for high and stable yield and tailor-made quality for rain-fed low input conditions in isolation from GM fields;
- Promoting participatory breeding approaches including breeders, farmers, researcher, processor, seed traders and spinning industry;
- Taking special attention for local adaptation, nutrient and water use efficiency, natural mechanisms against pest and diseases, niche markets and extreme weather events;
- Utilizing broad germplasm including the indigenous Desi cotton and other Gossypium species;
- Improving also inbred seed varieties for the option of farm saved seeds;
- Releasing varieties explicitly for organic and low input;
- Training farmers to produce their own seed.

To achieve these goals we join forces and partner in non-GM cotton seed issues to secure non-GM seed availability and genetic diversity over long-term.

Dharwad, 21 June 2011

Signed by: Dr. L. Savariraj, Sawed Trust; Dr. M. Abdaheer, Sawed Trust; A. Ambatipudi, Chetna Organic; D. P. Arya, Pratibha Syntex; Dr. A. Barik, DOCD Mumbai; R. Baruah, bioRe; V. Carriappa, Savayava Krishikar Sangha, HD Kote; M. Chinnaswami, Appachi Cotton; G. R. Dharmendar, Chetna Organic; Dr. D. Forster, FiBL; O. Gadade, Cotton Connect; P. V. Gaonkar, UAS Dharwad; A. Katyal, Sunstar Overseas Ltd; H. G. Kencharaddi, UAS Dharwad; M. Kunz, Remei AG; S. Makari, SOFA; Dr. M. Messmer, FiBL; P. Nagarajan, Textile Exchange; H. Patel, Agrocel; Dr. B. C. Patil, UAS Dharwad; Dr. S. S. Patil UAS Dharwad; K. Prasad, Sahaja Samrudha; G. Rajashekar, Centre of Sustainable Agriculture; M. Ramakrishnan, Arvind Limited; H. M. Ranganatha, UAS Dharwad; D. N. Reddy, Chetna Soceity; S. P. Reddy, UAS Dharwad; A. Roy, Ram Krishna Ashram Krishi Vigyan Kendra; K. Sainathan, Agrocel; M. S. Sunstar Overseas Ltd; R.T. Singh, Centre of Sustainable Agriculture; Dr. M. V. Venugopalan, CICR.

Annex

Annex 1: Programme

Disappearing non-GM cotton – ways forward to maintain diversity, increase availability and ensure quality of non-GM cotton seed

21st of June Tuesday

Start	Activity	Name
08.15 AM	Registration of delegates	All
09.15 AM	Welcome to the National Workshop on Disappearing non-GM Cotton	S.S. Patil
09.25 AM	Invocation	Ms Shilpa
09.30 AM	Welcome of the delegates, introduction of the delegates and the need for this workshop	Mr R. Baruah
09.50 AM	Inauguration	Dr D. Forster
09.55 AM	Inaugural address	Dr D. Forster
10.00 AM	Presidential remarks	Dr B.M. Khadi
10.20 AM	Vote of thanks	Dr B.C. Patil
10.30	Break and group photo	All
11.00 AM	Cotton Seed Development Strategies	Dr A. Barik
11.30 AM	CICR: fostering linkages to support organic cotton programmes	Dr M.V. Venugopalan
11.45 AM	Organic cotton markets and challenges	Ms P. Nagrajan
12.00 AM	Ensuring organic cotton quality and certification today	Mr R. Baruah
12.15 AM	Short discussion	All
12.30 AM	Cotton quality requirements for the industry	Mr D.P. Aria
12.45 AM	Experienced challenges and solutions of Chetna	Mr A. Ambatipudi
12.50 AM	Experienced challenges and solutions of Pratibha Syntex	Dr S.C. Pandey
01.00 PM	Experienced challenges and solutions of bioRe	Mr R. Baruah

01.10 PM	Short discussion	All
1.00 PM	Lunch	All
2.00 PM	bioRe - FiBL research activities	Dr D. Forster
2.30 PM	bioRe - Cotton screening (on-station, on-farm)	Mr R. Verma
2.50 PM	Seed multiplication and breeding for organic	Mr R. Shekar, Mr T. Singh
3.10 PM	Short discussion	All
3.25 PM	Perspectives and outlook for India's non-GM cotton in future	S.S. Patil
4.00 PM	Break	All
4.15 PM	Discussion and formulation of declaration for increasing availability and ensure quality of non-GM (low input/organic cotton) cotton seed in future	All
8.00 PM	Dinner	All

Annex 2: Participant List

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Annex 3: Photographs

Inauguration ceremony with bioRe Director R. Baruah, FiBL Chief Guest Dr D. Forster, H'ble Vice Chancellor UAS Dharwad Dr B.M. Khadi, Director Extension UAS Dharwad Dr. L. Krishna Naik, and Director DOCD Dr A. Barik (fltr), (Photo: FiBL).

Workshop participants in the front of Dr. S.A. Patil Administrative Block of the University of Agricultural Sciences, Dharwad, (Photo: FiBL).

Senior Scientist Dr. S.S. Patil from the Agricultural Research Station Dharwad Farm, UASD, Dharwad, during his exciting speech on “Perspectives and outlook for India's non-GM cotton in future” (Photo: FiBL).

Annex 4: Press Coverage

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Home | About Us | Top Stories | Tags

Categories

- Books
- Business
- Entertainment
- Environment
- Events
- Feature
- Health
- Health Science
- India
- Life Style
- National
- Odd news
- Politics
- Sci-Tech
- South Asia
- Sports
- Technology Industry News
- Thailand
- Thailand Tourism
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- World News

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GM cotton seeds a threat to Indian farmers: Researchers

Montag, 27. Juni 2011 15:45:57 by IANS (Leave a comment)

Dharwad (Karnataka), June 27 (IANS) Leading agricultural research institutions Monday warned that extensive use of genetically modified (GM) cotton seeds was destroying farming bio-diversity and jeopardising the livelihood of over four million cotton growers in India.

"Indian farmers grow 90 percent of hirsutum (species of cotton), of which 90 percent is GM cotton. Desi cotton will only survive if yields and fibre quality will improve and the maturity period reduced," said a joint statement by Karnataka's University of Agricultural Science, Dharwad, company bioRe India Ltd. and Research Institute of Organic Agriculture, Switzerland.

The statement cautioned farmers and other stake-holders that the supply shortage in organic cotton seeds will even effect the global organic cotton market, as India was the world's largest producer of organic cotton.

"The global market for organic cotton is threatened by erosion of conventional varieties by GM cotton," the statement said, adding that the voracious use of GM seeds amplified the risk of physical and genetic contamination of organic cotton with GM cotton.

The institutions also urged the government to implement policy changes in the sector to promote organic cotton seeds.

"The provision for the safeguard of organic farmer from contamination of GM crop has to be included in the seed act," said the statement, suggesting that a board for organic cotton with financial and implementation powers be formed.

Thaindian News, Monday, June 27, 2011. "GM cotton seeds a threat to Indian Farmers: Researchers"

THE FINANCIAL EXPRESS

16 Commodity Watch www.financialexpress.com

Monday, July 18, 2011, New Delhi

Cotton breeders fear GM backlash

Sandip Das
New Delhi, July 17

SINCE the introduction of genetically modified (GM) cotton crop, which accounts more than 90% in the total area under cotton in the country, there has been a fear of genetic erosion and loss of biodiversity, a group of reputed cotton breeders have expressed.

While acknowledging the fact that after introduction of GM cotton seeds in 2002 the country's production increased to 22.5 million bales (one bale = 170 kg) during 2010-11, from 13.6 million bales during 2002-03 which pushed India to the second position in world cotton production after China, scientists working the reviving the traditional varieties have expressed concern that since the market for non-GM seed has become completely eroded, there is a lack of interest by private companies to further invest in the sector.

"Research on cotton gene has gone backward by more than 10 years as scientists have simply stopped working on the genetic mechanism of controlling bollworm pests," SS Patil, senior Cotton Breeder, University of Agricultural Sciences, Dharwad (Karnataka) told *FE*. He said due to over dependence on GM crop farmers have lost their traditional knowledge on seed production.

Recently, many reputed cotton scientists at a national workshop on 'disappearing non-GM cotton' held at Dharwad University, supported by Central Institute for Cotton Research, Nagpur, bioRe India, various organic cotton groups and representatives from the textile and the seed industry had stated "the global market for organic cotton is threatened by erosion of conventional varieties by GM cotton". They also expressed that voracious use of GM seeds amplified the risk of physical and genetic contamination of organic cotton with GM cotton.

The Bt cotton variety was developed by Maharashtra Hybrid Seeds Co (Mahyco) in collaboration with US multinational Monsanto by using a gene—Cry1AC—derived from soil bacterium Bacillus thuringiensis which resist cotton pest or pink bollworm attack on the cotton crop.

A woman works in a cotton field in the outskirts of Daboi BLOOMBERG

However refuting the contention of scientists, Usha Barwale Zehr, chief technology officer, Mahyco said, "Pests would still evolve whether there is GM crop or not". She said the public sector research institution should invest more in maintaining genetic and bio-diversity as private sector does not have matching resources.

"Private sector is not interested in niche or speciality markets as long as the conservation of genetic resources has no direct financial benefit. It is therefore seen as a social responsibility to maintain and utilise the genetic diversity to be prepared to the unpredictable climatic change," Dionys Forster, Agronomist, International Division, Research Institute of Organic Agriculture, Switzerland said. "We need intensive research on developing varieties for organic and low-input conditions and combined efforts to re-establish the seed value chain for non-GM cotton", Dionys said.

Last year in a report submitted to environment ministry, KR Kranthi of the Central Institute for Cotton Research had cautioned about the likely failure of Bt cotton. "Farmers are not following the recommended 'refugia'. With about 90% area under Bt cotton, bollworms can develop resistance soon. The concern needs to be addressed on priority before it is too late," the report had stated.

Bt-cotton is grown in 11 countries worldwide and more than 10 million ha (90%) is under GM cotton. India also has become the largest organic cotton producer worldwide with 80% of the total global production.

Futures market helps in price risk management

NILANJAN GHOSH

Agricultural commodities traded in the international and domestic markets have revealed notoriously volatile prices, exposing commodity-dependent developing countries to extreme uncertainties in international trade. India has liberalised its imports in various agro-commodities lately and more so to tame food inflation.

Such high price risks emerging from high volatility of international commodity prices can be attributed to several demand- and supply-side factors. On the supply side, a distinguishing feature of international agricultural trade is that only few exporting countries dominate international trade. Even for a widely produced crop like rice, the share of the top five exporters is more than 76% and for all cereals the share of the top five is almost 75%. This lop-sided trading pattern does not impact on international prices. At the same time, the domination of a few large-scale multinational 'grain majors' and export state trading enterprises ("single-desk sellers") further complicates the scenario.

Internationally, early attempts to stabilise prices in the wake of price volatility have been dealt mainly with government funds and governmental intercessions. These involved measures like buffer stocks, buffer funds, commodity agreements, or government intervention in commodity markets. Internationally, there is little evidence of the success of such schemes. Buffer funds have gone bankrupt, programmes in the late 1980s. International commodity agreements have lapsed, as in the cases of coffee, cocoa, tin, and sugar.

It is in this context that the role of the futures market arises. Through wide participation by the stakeholders, the futures market helps price risk management or hedging and price discovery. The use of such an instrument is particularly required in an increasingly liberalised environment. Futures markets can complement and even substitute traditional policy instruments that are used to cope with price volatility. Through the mechanism of price discovery, prices reflect information about the role of private players, government's policies, etc.

In dealing with basis risk and international price volatility, developing countries like Argentina, Brazil, China, Hungary, India, Malaysia, the Philippines, Russia, and South Africa are increasingly establishing commodity derivative markets. The success of agro-commodity futures in other countries in dealing with agricultural price volatility, and helping in local price discovery, does prove a case for a developing nation like India to further encourage development of agro-commodity futures markets. In an era of trade liberalisation, one cannot close eyes to

Interaction with industry can help bridge data gap

SUSHIM BANERJEE

Industrial production index signals the health of the industry which holds the back bone of economic growth especially for a developing country.

Industry's response to the various factors impacting the political and socio-economic scenario is reflected in IIP indices which was negative (-1%) in May 2011 compared with the previous month and 14% lower than March'11. Official data shows that maximum fall in output have been observed in Capital Goods, Manufacturing of electrical machinery and apparatus, machinery and equipments and motor vehicles. But the conclusions thus drawn based on the indices released cannot be said to be final as the data for April 2011 which has already gone for first revision would undergo another final revision when the data for July 2011 is released in September 2011. This implies that nothing can be concluded if industry witnessed a higher growth in the first month of the new financial year over the next month until a gap of four months. This makes

luctance in reporting, non-receipt of production figures from the different units in time and the bunching of data after a gap of few months. It is generally felt that data received by the monitoring agency are not regularly analysed with regard to the periodicity of bunching of data changing the source of data in tune with the reorganised role of the unit/agency and similar other factors.

There are numerous instances when production data religiously repeated long after the closure of the unit. The argument that governmental data collecting agencies have no wherewithal to check the authenticity of the data, offers little justification for the successive failure of policy guidelines for the specified group of industries. PMI indices indicate relative perception of the market by the participants and generally offer a basis of comparison of the state of industrial economy particularly the manufacturing sector across the country.

However, compared to the market perception of the selected group there is an essential need for absolute numbers which are robust and without which the government is incapable of adopting suitable policy changes. Surely there exist many innovative, cost effective methods by which reliable and authentic data with regularity and periodicity can be captured and utilised for policy decisions. ... much more effective way of interface with the industry, associations, and chambers only on the issue is needed to bridge the wide gap between reality and data

The Financial Express, Monday, July 18, 2011. "Cotton breeders fear GM backlash"