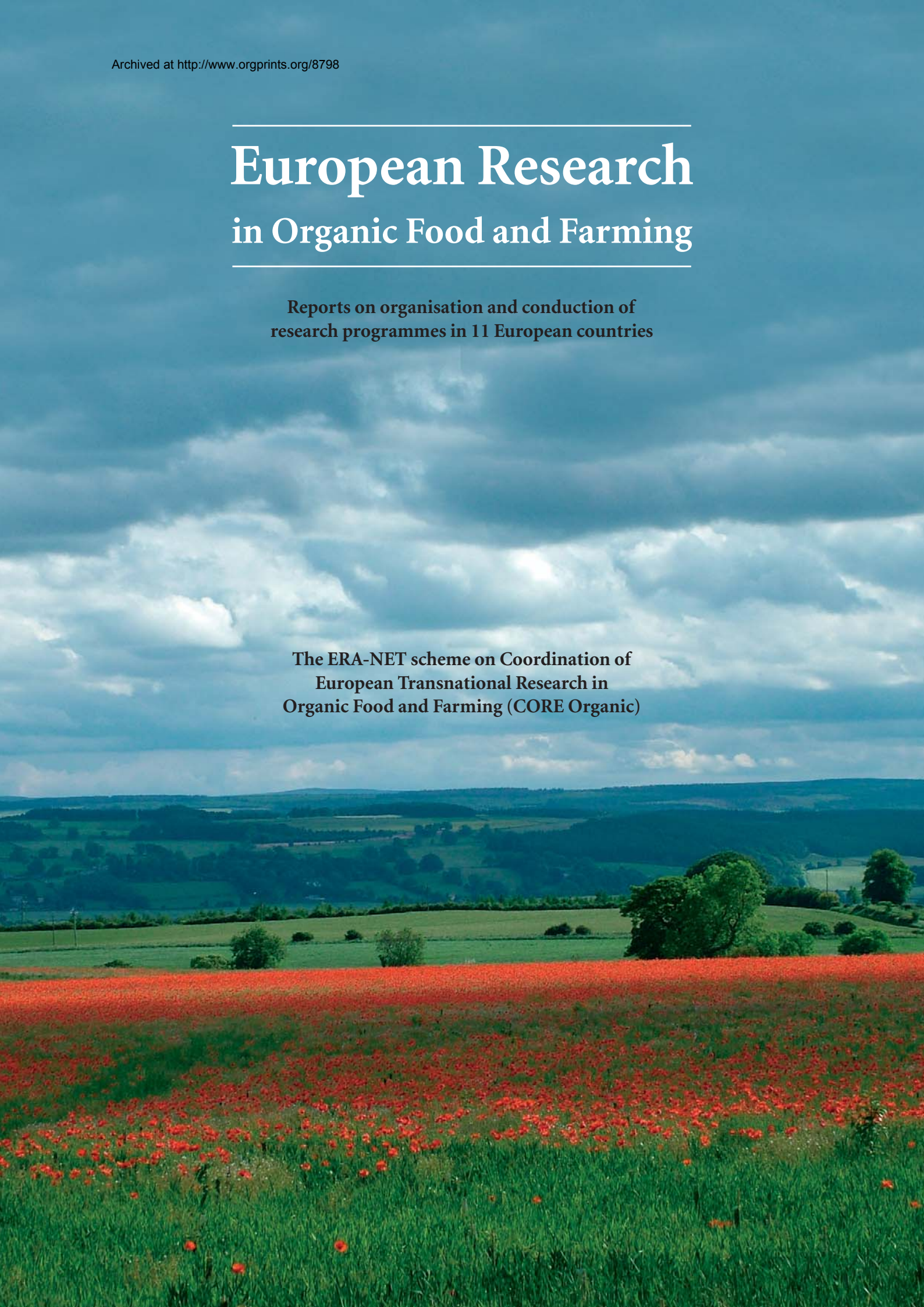
European Research
in Organic Food and Farming

Reports on organisation and conduction of research programmes in 11 European countries

The ERA-NET scheme on Coordination of European Transnational Research in Organic Food and Farming (CORE Organic)



This publication represents reports on the organization and conduction of research programmes in 11 European countries involved in the ERA-NET/1/CA-SSA-B No 011716 "CORE Organic" (Coordination of European Transnational Research in Organic Food and Farming, Project no 011716). This publication evolved as a comprehensive project output but it is not a deliverable as such. The editors gratefully acknowledge financial support from the Commission of the European Communities, under the ERA-NET scheme of the Sixth Framework Programme. The text in this publication does not necessarily reflect the Commission's views and in no way anticipates the Commission's future policy in this area.
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Authors of the particular country reports are the partner organisations involved in the CORE Organic project. The contents and information especially regarding public research budgets are mainly focussed on the research funding programmes which are managed and / or driven by the CORE partners. Partners realised the reports to the best of one's knowledge but cannot raise a claim of completeness.

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For further information see the project homepage at www.coreorganic.org.

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Introduction

Due to the genesis of research in Organic Food & Farming the present scientific resources in Europe are still scattered. A cross-border aggregation of these resources will help to reach a higher relevance of organic agriculture and a fortification of the involved benefits for rural development, environment and consumers.

These benefits are more and more acknowledged by policy makers and governments. Therefore, in several European countries publicly funded research programmes regarding Organic Food & Farming were set up. The existence of these national programmes provides a brilliant opportunity to manage the aggregation of scientific resources as mentioned above: Within the project CORE Organic ("Coordination of European Transnational Research in Organic Food and Farming") decision makers and research managers from different European ministries, funding bodies and other programme operating organisations work together for an increased exchange of information, for a coordination of existing research and integration of knowledge, for sharing and developing best practice to evaluate organic research and for the identification and coordination of common research needs.

The CORE project is running within the European Commissions ERA-NET Scheme, which intends to step up such cooperations between national research activities. Participating countries are Austria, Denmark (coordination), Finland, France, Germany, Italy, The Netherlands, Norway, Sweden, Switzerland and United Kingdom. Initially, the initiative comprises these eleven countries, but it is open to include all European countries with a national research programme for research in Organic Food & Farming.

This book is a summary of eleven country reports and developed as an additional project output to the mapping of existing information about programmes, institutions, projects and facilities within the field of Organic Food & Farming research in the CORE Organic partner countries. During the organisational period of the mapping for the enlarged database Organic Eprints the project consortium realised the limited resources available for this task. Therefore, it was decided to gather the most important data about organic research in a condensed form in individual country reports. All country reports in this publication follow a standardised structure starting with the history of organic farming research. Then the organisational structure or research set up is explained followed by financial details about the different research programmes existing in this field. Furthermore the country reports give an overview about existing national research facilities and describe the national procedures for initiation of research and stakeholder engagement, selection criteria and evaluation procedures. The reports end with the explanation of utilisation of research findings and national scientific education and research schools.

After finalising the individual country reports it was a challenge to make this first comprehensive European overview about the status quo of research in organic food and farming available as a publication.

The individual country reports were finished between the end of 2005 and the beginning of 2006. This comprehensive publication reflects the status quo of this time period. The detailed editorial dates are mentioned in the beginning of every country report.

Stefan Lange & Ute Williges

CORE Reports Research CORE Organic

CORE Organic Country Report Austria

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Content

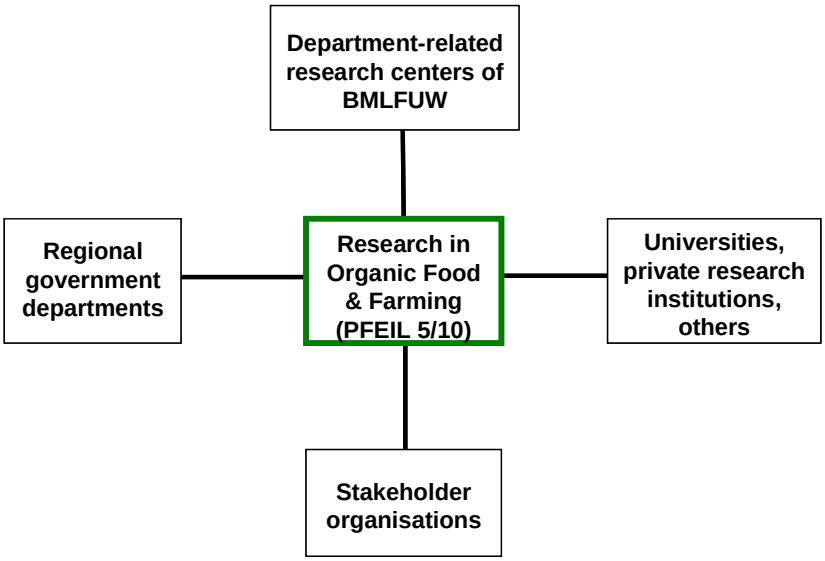
1 History

Austria has a long tradition in organic farming. The first organic farms were established in Carinthia (Kärnten) in the years 1927 to 1935.

- 1980 the „Ludwig Boltzmann Institute for Biological Agriculture and Applied Ecology“ was founded (now Bio Forschung Austria).
- 1981 A university lecture "Introduction to organic farming" at the University of Natural Resources and Applied Life Sciences (BOKU) Vienna was offered for students as a voluntary course
- 1991 The Research Initiative for Organic Farming came into existence as an informal alliance of scientists conducting work in the field of organic farming
- 1992 A guest-professorship “Organic Farming” at the University of Natural Resources and Applied Life Sciences (BOKU) Vienna was established
- In the years 1994/95 the Research Initiative for Organic Farming carried out work on the research project “Integral Key Topics and Methodological Criteria for research on Organic Farming” with the goal of clarifying the future content and methodological approach of research in organic farming under special consideration of Austria
- 1996 The Institute for Organic Farming (IfÖL) at the University of Natural Resources and Applied Life Sciences (BOKU) Vienna was established
- 2000 Start of lectures on organic farming „Introduction in organic farming“ as compulsory subject at the University of Natural Resources and Applied Life Sciences (BOKU) Vienna and the possibility to choose organic farming as main focus for graduate studies in “Agriculture”. Also courses on Organic Farming in arid, semiarid, subtropical and tropical climate were introduced.
- In 2001 the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW[)] involved all stakeholders on the issue of future developments in Organic farming and launched a Bio-Enquête. The outcomes of these discussions were integrated in the Action Plan Organic Farming (2001-2002).
- In February 2001 BMLFUW presented the first Action Plan for Organic Farming. The Action Plan for Organic Farming provides recommendations for policy development and funding priorities in the areas of education and training, extension services, research, marketing, consumer information and public relations, quality management and quality control. The establishment of a regular discussion platform on organic farming “Biologische Landwirtschaft” involving all stakeholders was one of the recommendations of the Action Plan.
- In July 2003 the second Action Plan was published. At present the 3rd Action Plan for Organic Farming for the years 2005-2008 is in place.

2 Organisation

In Austria research activities in the area of organic food and farming are mainly financed by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW). To some extent research activities are funded in cooperation with other regional government departments (“Bund-Bundesländer Kooperation”), the City of Vienna, stakeholder organisations or in cooperation with private funders.



Organic Farming Research in Austria is mainly carried out by three types of organisations:

Universities

- University of Natural Resources and Applied Life Sciences in Vienna (BOKU) [1]
- University of Veterinary Medicine, Vienna (VMU) [2]
- University of Innsbruck, Mountain Agriculture Research Unit [3]

Private research institutions:

- Bio Research Austria (formerly Ludwig Boltzmann Institute for Biological Agriculture and Applied Ecology)
- FIBL Austria [4]

Federal offices and research centers

- Agricultural research and education centre Raumberg-Gumpenstein [5]
- Federal Institute for Less-Favoured and Mountainous Areas [6]
- Federal College and Office for Viticulture and Pomology [7]

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[1] Universität für Bodenkultur / University of Natural Resources and Applied Life Sciences in Vienna (BOKU)[1], Vienna, http://www.nas.boku.ac.at/oekoland.html?&&L=0

[2] Veterinärmedizinische Universität Wien /University of Veterinary Medicine Vienna, http://www.vu-wien.ac.at/content/e809/e1118/index_ger.html

[3] Forschungsschwerpunkt Berglandwirtschaft an der Universität Innsbruck / University of Innsbruck, Mountain Agriculture Research Unit, http://www2.uibk.ac.at/berglandwirtschaft/index.html

[4] Forschungsinstitut für biologischen Landbau / Research Institute of Organic Agriculture (FiBL), Wien http://www.fibl.org/fibl/portrait-oesterreich.php

[5] Höhere Bundeslehr- und Forschungsanstalt für Landwirtschaft Raumberg-Gumpenstein / Agricultural research and education centre Raumberg-Gumpenstein, Irdnin, http://www.gumpenstein.at/

[6] Bundesanstalt für Berbauernfragen / Federal Institute for Less-Favoured and Mountainous Areas, Wien, http://www.bergbauern.net/2005/content/section/5/237/

- Federal Agency of Water Management [8]
- Federal College and Research Station for Horticulture [9]
- Federal Institute of Agricultural Economics [10]

Stakeholder organisations:

Since January 2005 all existing farming associations have been united under the umbrella of Bio Austria. Bio Austria acts as the union of over 14 000 organic farmers, a network for organic farming in Austria and a competent contact point for organic food and farming.

3 Mapping research programmes

In Austria there is no specific programme dedicated solely to organic food and farming research. Organic food and farming research is embedded in the Programme for Research and Development (PFEIL) of the Federal Ministry for Agriculture, Forestry, Environment and Water Management (BMLFUW).

3.1 PFEIL 05 (2002 to 2005)

With PFEIL 05[11], the Programme for Research and Development for the period 2002 to 2005, for the first time a research programme of several years has been established, implemented and carried out. In the programme, the tasks as defined by the Federal Ministries Act Amendment 2000 on Applied Research in the fields of agriculture, forestry, environment and water management were fulfilled. The pertinent responsibilities were distributed among the ministry-related research centres, contracted research and, to a limited extent, corporate research entities under public law outsourced by the Ministry.

PFEIL 05 was concentrating all research activities on the Ministry's four strategic key areas:

- Rural Areas (RA)
- Agriculture and Food (AF)
- Water (W)
- Environment and Waste Management (EW)

Organic farming is one of the 31 subject areas defined within the four strategic key areas. PFEIL 05 provided increased budget allocations for 9 defined key areas for the whole programme duration; organic farming was one of these defined priority areas.

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[7] FHöhere Bundeslehranstalt und das Bundesamt für Wein- und Obstbau in Klosterneuburg / ederal College and Office for Viticulture and Pomology, http://bundesamt.weinobstklosterneuburg.at/start.php

[8] Bundesamt für Wasserwirtschaft / Federal Agency of Water Management, Wien, , http://www.baw.at/

[9] Höhere Bundeslehr- und Forschungsanstalt für Gartenbau Schönbrunn in Wien / Federal College and Research Station for Horticulture, http://www.hblagart.bmlf.gv.at/

[10] Bundesamt für Agrarwirtschaft / Federal Institute of Agricultural Economics, Wien, http://www.awi.bmlfuw.gv.at/index.html

[11] PFEIL 05 - Programm für Forschung und Entwicklung im Lebensministerium, http://www.landnet.at/article/articleview/17626/1/5106

Within the priority area Organic farming the following subject areas were defined in PFEIL 05:

- Improvement of plant production
- Improvement of livestock farming
- product quality, production standards

3.1.1 Distribution of funding

The total expenditure for organic food and farming research for the years 2002 to 2004[12] amounted to € 2 987 579. The distribution within the different subject areas is shown in Figure 1.

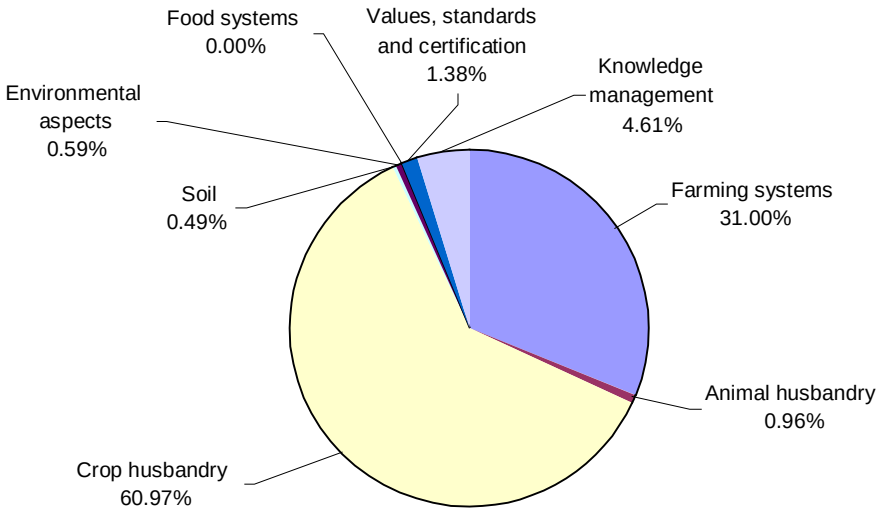

Figure 1: Organic food and farming research funding PFEIL 05 (2002 to 2004) in Austria according to subject areas

3.2 PFEIL 10 (2006 to 2010)

3.2.1 ABOUT PFEIL 10

PFEIL 10 [13] is the new Programme for Research and Development in the BMLFUW for the period 2006 to 2010. Organic Farming will continue to be an issue with high priority in this programme. In the programme PFEIL 10 the following strategic areas in accordance with the guiding principle of the Ministry have been defined:

- Basis of life
- Living space
- Food

Within these three strategic areas 21 key areas in total have been defined. Organic farming is one of these key areas within the programme.

[12] Figures for the year 2005 will not be available before July 2006

[13] Programm für Forschung und Entwicklung im Lebensministerium PFEIL10: http://www.landnet.at/article/articleview/43399/1/5106/

PFEIL 10 provides for an increased allocation of funds for 8 out of 21 defined key areas for the programme duration. The key area organic farming is one of the priority areas, where an increase in funding compared to the expenditure of 2004 for the period 2006 to 2010 is planned.

Within the priority area organic farming the following subject areas and tasks are defined in the programme PFEIL 10:

Quality, Products and Marketing

- Uniform quality standards and production rules for organically produced food with an emphasis on health, product quality and quality of life
- Influence of legal norms (especially VO 2092/91) on the development of organic farms and biological agriculture in general
- Strategies for the conversion of enterprises, model farms and aspects of labour economy, further development of organic farming
- Development of schemes for the improved marketing of organic products

Plant Production

- Development of holistic production systems which consider the factors of site, plant nutrition, plant protection, cultivation techniques, ecology, resistance and tolerance
- Use of varieties and genotypes with due consideration of sound use of energy and resources
- Improvement of biological plant protection, alternative fertilisation systems
- Organic production in special sectors (i.e. vegetables, ornamentals)

Animal Production

- Profitability of animal husbandry in organic agriculture in harmony with animal welfare
- Composition of specific feeding rations
- Suitability of breeds for organic agriculture
- Development and examination of new stable systems that are suited for organic animal husbandry and allow to reach conformity with the standards, studies on the design of facilities to give the animals space to move (stable floor, cleanness, hygienic safety, labour economics, possibility for the animals to root and grub)
- Development of suitable therapeutic agents for organic animal husbandry

3.2.2 Areas of application of PFEIL 10

PFEIL 10 applies to contracted research according to the Research Organisation Act (Forschungsorganisationsgesetz – FOG) and to federal offices and research centres of the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW).

The following federal offices and research centers are under the direct responsibility of the Ministry. They are conferred state tasks of evaluation, control and of higher education and carry out research activities to a varying extent:

- Federal Agency for Water Management
- Federal Office for Wine-Growing
- Federal Institute for Agricultural Economics
- Federal Institute for Less Favoured and Mountainous Areas
- Federal Institute for Alpine Dairy Research

- Agricultural research and education centre Raumberg-Gumpenstein
- Federal College and Research Centre for Agriculture, Agricultural Engineering and Food Technology Francisco Josephinum at Wieselburg
- Federal College and Office for Viticulture and Pomology
- Federal College and Research Centre for Horticulture at Schönbrunn

3.2.3 Implementation

The programme PFEIL 10 defines the framework within which the federal research centres and contract research is implemented.

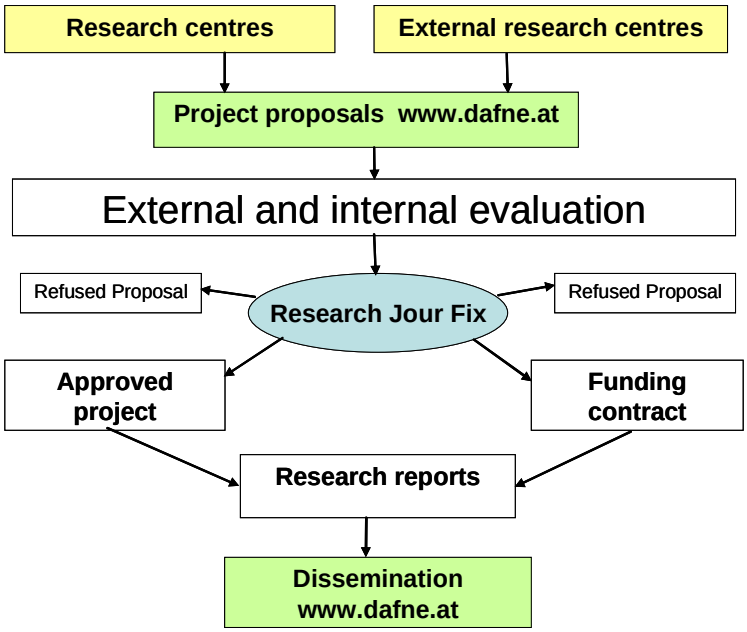

Figure 2. Organisation of research in organic food and farming in Austria. The Homepage www.dafne.at is a web-based platform for research project management

4 Financing

Research in organic food and farming is mainly funded by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW).

The Budget of BMLFUW is divided into:

- Funds for contract research
- Expenditure for research of federal offices and research centres

The total budget for research in organic food and farming for the years 2000 to 2004 amounted to € 4.45 million (see Table 1). This figure includes the budget for external research and the budget for research activities of the federal research centres. More than 50% of the expenditure for organic food and farming was allocated to federal research centres (in total € 2.6 million for the years 2000 to 2004). The other part was allocated to contracts with external organisations (in total € 2.04 for the years 2000 to 2004).

All research expenditure of the federal research centres of BMLFUW is part of the institutions' total annual budget. The actual budget spent on research of these research centres can only be calculated at the end of each year in the annual financial statement.

Table 1: Organic food and farming research funding (2000 to 2004) in Austria according to subject areas and in total (in Euro)

			PFEIL 05				
Subject area	**2000**	**2001**	**2002**	**2003**	**2004**	**Total**	
Farming systems	14 535	73 121	32 554	61 7578	276 151	1 013 938	22.76 %
Animal husbandry	54 309	17 846	12 566	16 134	0	100 855	2.26 %
Crop husbandry	484 636	632 156	474 459	588 158	758 775	2 938 185	65.97 %
Soil	10 493	28 241	0	14 535	0	53 268	1.20 %
Environmental aspects	0	0	0	0	17 500	17 500	0.39 %
Food systems	25 812	17 267	0	0	0	43 079	0.97 %
Values, standards and certification	0	0	11 300	22 000	8 062	41 362	0.93 %
Knowledge management	25 084	83 014	5 300	459 88	86 521	245 907	5.52 %
Total	614 868	851 645	536 179	1 304 392	1 147 009	4 454 093	100.00 %

5 Research facilities

5.1 Research facilities which are related to the Federal Research Institutes

Agricultural research and education centre Raumberg-Gumpenstein **Institute for Organic Farming and Biodiversity**		
Contact person:	Dr. Andreas Steinwidder, Altirdning 11, A - 8952 Irdning, Phone: +43-3682-22451-400 http:/www.raumberg-gumpenstein.at	
Infrastructures	Research farm and animal research facilities: "Moarhof"	The Institute of Organic Farming and Biodiversity is a leading competence centre for research and consultancy on organic farming in Austria. There are resources directly used for applied research, including grassland, dairy cows and other cattle. There are facilities for accommodating cattle and recording their individual intakes, yield etc. The experimental and education farm covers 45.3 hectares (42 hectares grassland, 3.3 hectares arable land) 30 dairy cows, 20 calves, 15 growing cattle, 40 piglets, 60 pigs, 12 sows. The focus lies on research in organic dairy farming, animal nutrition (feeding experiments), preventive animal health, grassland management and organic plant production under harsh climatic conditions. There are possibilities for group feeding and in the future also for individual feeding of 30 cows (CALAN-System). Currently in conversion.
	Research farm and animal research facilities: Research station Wels-Thalheim	The herd of the research station comprises 30 sows with piglets. A laboratory for blood examination and microbiology and the gene bank for endangered productive livestock are situated at this research unit. There are possibilities for group and individual feeding of pigs. The focus lies on preventive animal health, animal husbandry (pigs), biodiversity of productive livestock and organic legislative activities. Converted since 2005.

	Research farm: Research station Lambach/Stadl-Paura	18.4 hectares (15 hectares arable land, 3.4 hectares grassland) are available for research work on organic plant production (cereals, legumes, pasture) including fertilization, quality measurements, investigations on alternative plants (i.e energy plants), developing ecologically acceptable methods to minimize the damage caused by diseases and investigations on nutrient cycles. Currently in conversion.

Federal College and Office for Viticulture and Pomology		
Contact person:	Dr. Ferdinand Regner, Wienerstr. 74, A - 3400 Klosterneuburg, Phone: +43 2244 2286-32, http://bundesamt.weinobstklosterneuburg.at/	
Infrastructures	Experimental fields at research and education farm "Agneshof" and "Haschhof"	At the research and education farm "Agneshof" near Vienna 1 hectare of vineyards are used for different experiments concerning organic viticulture and 2.5 hectares fruit plantations (apple, pear, apricot) at the education farm "Haschhof" are used for experiments about pomology.
	Laboratories	At the college in Klosterneuburg laboratories for chemical, biological and molecular analysis are located.

5.2 Other research facilities

University of Natural Resources and Applied Life Sciences Vienna (BOKU), Department for Sustainable Agriculture , Division of Organic Farming		
Contact person:	**Prof. Dr. Bernhard Freyer, Gregor Mendel Straße 33, A - 1180 Wien, Phone: +43 1 47654-3750, http://www.nas.boku.ac.at/oekoland.html**	
Infrastructures	Long-term crop experiment MUBIL"	This long term field experiment concerning the monitoring of the effects of conversion to organic farming on soil, water, flora and fauna is performed at the organic farm "Rutzendorf" of the BVW GmbH (Federal experimental station Ltd.) in the Marchfeld and started in 2003. The experimental area covers 142.9 hectares cropland (organic since 2003) and provides the basis for the monitoring of the different aspects of the conversion to organic farming. A scientific concept for the conversion from conventional farming to organic farming is developed and put into practice. The effects of the conversion to organic farming onto soil, water, flora and fauna are estimated by specific parameters. The effects of three different organic fertilizer strategies onto the soil properties and crop production are compared. The importance of

		permanent habitat structures (hedge rows, groves, etc.) is characterized, and new habitat structures shall be planned and laid out.
	Research farm Gross-Enzersdorf	This 26 hectares cropland in Pannonian climate was converted in 1998. A movable greenhouse (240 m^2) is available for crop rotation studies. Cultivation of cereals, oil seeds, legumes.
	Laboratories	A laboratory for analysis of total C and N with a DOC/TNb analyser, for analysis of mineral nitrogen, N mineralisation, soil microbial biomass, Arginine ammonification and mycorrhizal colonisation is available at the University of Natural Resources and Applied Life Sciences (BOKU) Vienna.

5.3 On-farm research

Various experiments of the different research institutions are carried out in cooperation with organic farmers and agricultural schools or colleges. These are mainly projects concerning crop husbandry and farming-system analyses. The contracts depend on type and duration of the experiments and are not permanent.

5.4 Funding of research facilities

There is no specific extra funding for the research facilities of external institutions. For the federal research centres the costs of research facilities are included in the individual budgets of the institutions and therefore financed within the research activities.

6 Initiation of research and stakeholder engagement

6.1 Stakeholder engagement

6.1.1 Research Initiative for Organic Farming

The "Research Initiative for Organic Farming" (Forschungsinitiative Biologischer Landbau – FBL) - see also chapter 1 - prepared the ground for defining the content and also the methodological approach of research in organic farming under special consideration of Austria.

The group of researchers of the FBL carried out a review in 1994/95 on "Integral Key Topics and Methodological Criteria for Research on Organic Farming". Based on strategic and methodological analyses, definition of priority areas and methodological criteria for research in organic farming in Austria conclusions and recommendations for financing organic farming research were defined.

6.1.2 Bio-Enquête and Action Plan — Developments in organic farming

In 2001 the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMULF) involved all stakeholders on the issue of future developments in organic farming and launched the so-called Bio-Enquête. These discussion fora involving different stakeholders take place every year.

The third Action Plan on Organic Farming 2005-2006 identifies initiatives and actions in the areas funding schemes, extension services, education, research, marketing and public awareness.

6.2 Initiation of research

6.2.1 Initiation of the research programme PFEIL 05

The programme areas of PFEIL 05 were defined by the policy departments of the BMLFUW and the federal research centres. PFEIL 05 covers all research activities of BMLFUW (research at the federal research centres and contract research), see also chapter 3. In the programme PFEIL 05 several priority research areas were defined, in which research activities should be intensified. The area of organic farming research has been identified as one of the priority areas.

6.2.2 Initiation of the research programme PFEIL 10

Based on the experiences of PFEIL 05 and based on an internal mid-term evaluation of the programme PFEIL 05 the first ideas for a concept for a new programme PFEIL 10 were drawn up and discussed with policy departments and department related research centres. The whole Austrian agricultural and environmental research community was also invited to contribute ideas to PFEIL 10. To develop the future research strategy of BMLFUW was also the main goal of a stakeholder conference that took place in June 2005. All these inputs contributed to the draft for PFEIL 10. To gather further inputs BMLFUW organised a stakeholder conference in November 2005 to discuss the final draft of PFEIL 10. Organic farming research will continue to be a priority area for research also in the new programme PFEIL 10.

6.2.3 Establishment of research groups and initiation of research projects

PFEIL 10 serves as a basis for decision-making of

- awarding contracts,
- calls for tenders,
- initiatives and
- co-operations of the R&D activities of the BMLFUW.

6.2.4 Contract research

In this area R&D projects are granted on the basis of demand, preparation and implementation of the political goals in the four strategic key areas.

Usually project proposals can be submitted any time. The instrument of predefined competitive calls for proposals has only been used in one exceptional case in the programme PFEIL 05.

In order to obtain added value PFEIL 10 is increasingly counting on calls for tenders and co-operations and networking with other programmes.

7 Selection criteria and evaluation procedures

7.1 Selection and establishment of projects

Contract research (external)

Applications for external projects can be submitted any time only in electronic format via www.dafne.at. Before proposals are evaluated they are checked if they are within the scope of the programme PFEIL 10. The evaluation of project proposals is carried out in a written procedure by involving external experts and experts from relevant policy departments.

Evaluation criteria

- Importance for agriculture, forestry, environment and water management
- Consistency and overlapping with other federal research programmes
- Project management and scientific excellence
- Importance of the problem and contribution to problem solution
- Urgency of the problem solution in question
- Adequacy of the project volume
- Use of scientific networks
- Realisation of the expected results in cooperation with the future users

For each of the criteria the experts are asked to rate the proposals with scores from 1 to 5 (1 = excellent, 5 = unsatisfactory) and to give explanations for their assessment.

Based on the results of the evaluation the funding decision on individual project proposals is taken in regular meetings of the "ForschungsJourFixe" (involving staff members of all the different policy departments of the Ministry).

Federal research (internal):

For internal project submissions (i.e. research projects submitted by the ministry-related research centres) the authorisation for the realisation of the project will be given by the competent departments of the Ministry after consultation with the above mentioned research jour fixe. Funds for research are made available from the budget at the disposal of the relevant departmental office. Cost projections and reporting constitute the basis for the internal research controlling in the departmental offices.

7.2 Monitoring progress in ongoing projects

One of the key activities of the Department of Research and Development of BMLFUW is to coordinate, evaluate and manage the research projects in accordance with the overall objectives of the whole research effort. This is done by means of the following management activities:

- Continuous dialogue with the project leaders in order to ensure that the individual projects are conducted according to plans, and, if necessary, ensure that plans are changed.
- Evaluation of periodic progress reports and final reports
- Motivating maximal publication and communication activity, partly through reports and partly through external meetings and information sessions
- Striving for the greatest possible synergy in the allocation of resources

- Encouraging the review and evaluation of research findings in both national and international fora
- Presentation of the most interesting research results to a broad range of stakeholders (PAP-Präsentation aktueller Projekte)

8 Utilisation of research

Knowledge dissemination is integrated in research projects funded by BMLFUW. For this purpose all funded projects contain a special paragraph on dissemination activities planned and for which target groups.

BMLFUW provides financial support for advisory services in Austria. The advisory service in Austria is free of charge to all farmers. The Chamber of Agriculture has established a special advisory service for organic farmers.

Almost 90% of the organised organic farmers are members of "Bio Austria[14]". This farming association offers most of the private consultation service.

BMLFUW supports within the frame of its national funding scheme for innovation (Innovationsförderung)) also some applied research and technological development in the areas crop production, animal production, processing and marketing for organic food and farming.

9 Scientific education & research schools

Higher education at university level is undertaken at the University of Natural Resources and Applied Life Sciences (BOKU) in Vienna. Since 2005 the Master study "Organic Farming" exists. Lectures, seminars and excursions concerning organic farming issues take place at the following BOKU institutes:

- the Institute of Agricultural Environmental and Energy Engineering
- the Department of Livestock Science
- the Institute for Agricultural Economics
- the Institute for Organic Farming (IföL)

Some lectures are given at the University for Veterinary Medicine, at the Research Institute for Biological Agriculture and the Institute for Alpine Agriculture at the University of Innsbruck.

[14] Bio Austria, Wien, http://www.bio-austria.at/

CORE Organic Country Report

Report on Danish Research in Organic Food and Farming

Prepared by Claus Bo Andreasen & Erik Steen Kristensen,
Danish Research Centre for Organic Food and Farming (DARCOF)

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http://www.darcof.dk/

December 2005

Content

1 Introduction

During the 1990s, Organic Food and Farming production became an important sector in Danish agriculture. From something, which hardly could be measured in the early 1990s, both production and consumption of organic products rose significantly during the decade.

In 2003 there were 3510 organic farms in Denmark corresponding to 7.2 % of the 48613 farms in Denmark. The organic farmers were cultivating approximately 168022 hectares making up for approximately 6.3 % of the total cultivated area.

The rapid rise of the production in the 1990s was chiefly a consequence of increased consumer demand for organic products. Today, Denmark has one of the world's highest consumptions of organic products; approximately five percent of all food products sold in Denmark are organic.

The development of the Danish organic production has since the mid 1980s been supported by the various Danish governments. Organic farming has foremost been considered to represent a more environmental-friendly agricultural production, but also in relation to food quality, food safety, as well as animal health and welfare, it has been recognised that organic farming represents possible answers to problems haunting conventional farming systems.

Support to the development of Organic Food and Farming systems has thus included economic support for conversion of farms, regulation and control, advisory services, education and public information together with the initiation and conduction of specific research programmes.

The aim of this country report is to present an overview of the Danish research in Organic Food and Farming. The overview is given within the subjects below.

2 History

2.1 Development of Danish research in organic farming

The early development of organic farming in Denmark was inspired by the formation of alternative growing systems as they appeared early in the 20th century in Germany, England, Switzerland and the US. It was however, problems in the 1970s and 1980s related to the industrialised agricultural production methods that sparked a more weighty interest in alternative production - an interest that could be identified in environmentally conscious farmer groups and at several universities.

Denmark has also contributed to the international development of organic farming research. In 1996, the 11th Scientific conference1 of the International Federation of Organic Agriculture Movements (IFOAM) took place in Copenhagen, which from a scientific point of view has been one of the best IFOAM Conferences. In 2006, DARCOF is organising the Joint Organic Congress at which, for the first time, all current European research projects related to organic farming will present their results.

2.2 The first research initiatives

Even though the Danish Research Council during the 1970s hosted several discussions on research in organic farming it was not until the 1980s that the discussion became productive. In 1983, a study conducted on organic farms mapped the most evident research needs. The study was followed by a series of institutional projects on the influence of various production methods on crop yield, plant pests, nutrient turnover and soil quality, but also projects dealing with product development and marketing issues etc.

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[1] Information on the 11th IFOAM Scientific Conference and abstracts
http://www.organic.dk/english/ifoam/conf96/index.htm

Later, in 1986, the Minister of Agriculture initiated a five-year research programme, which – among others - opened up for research projects on various aspects of organic farming. However, it was not until 1993 that the first research programme dedicated to organic farming was initiated. The programme duration was five years and it involved 13 projects with a total value of 50 million Danish Crowns (DKK; approx. € 6.7 million). The projects were fixed within two main areas: 1) research in basic organic principles and 2) development of organic production methods.

2.3 The first Danish Action Plan

Experiences from the initiation and evaluation of the first research programme in organic farming were utilised in the preparation of the first Danish Action Plan for Organic Farming, which was published in 1995. The action plan was prepared as a result of an overwhelming consumer demand for organic products - which the organic producers could not fulfil. The scope of the Action Plan was thus to look for ways to improve production and to ease the transition for those farmers, who wanted to establish an organic production.

The Action Plan contained several recommendations on research: Generally, it was recommend that research and the education of researcher with expertise should be intensified. Specifically, it was recommended to establish an organic research station as a base for the research. Finally, the Action Plan noted the need for further coordination and transdisciplinary cooperation within organic farming research.

2.4 Establishment of DARCOF

In late 1995, as a response to the recommendations in the Action Plan the Ministry of Food took the initiative to establish the Danish Research Centre for Organic Farming (DARCOF)[2]. The responsibilities of the new "research centre without walls" included initiation, coordinating and utilisation of research in organic farming. The idea was to make use of best available research knowledge at existing institutes, and to make this knowledge relevant for organic farming. The individual researchers should be able to stay in their own research environment, but work with organic farming in collaboration with researchers from other institutes.

2.5 DARCOF I

At the same time as DARCOF was established, the Ministry set aside DKK 100 million (approximately € 13 million) for a research programme (DARCOF I) to be conducted from 1996 to 2000. Furthermore, the Ministry provided funding for the establishment of an organic research station at Rugballegaard, together with organic workshop sites at several localities. Finally, a research professorship in organic plant production was established at the Royal Veterinary and Agricultural University. During 1996 the programme was initiated with 33 research projects, involving 13 institutions and about 100 research workers.

2.6 Second action plan for organic farming

In January 1999, the Ministry of Food, Agriculture and Fisheries had the second Action Plan prepared. The title of the new plan was "Developments in Organic Farming", which was to reflects the Ministry's commitment to significant expansion of organic food production and sales in Denmark. In relation to the first action plan, where the focus was production, the new action plan focused merely on the expectations and needs of the consumer, and safeguarding confidence in organic products was seen as a vital factor in the continued growth of the sector.

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2 Forskningscenter for Økologisk Jordbrug (FØJO) / Danish Research Centre for Organic Farming (DARCOF). www.fojo.dk and www.darcof.dk

2.7 DARCOF II

The Action Plan also examined barriers and possibilities for the development of commercial areas of organic food production. For many of these areas it was recommended to implement research in order to investigate possibilities for further developments. The overall recommendation on research was to initiate a new research programme within DARCOF.

Timeline for Danish research in Organic Food and Farming

- 1983 Mapping of research needs at organic farms
- 1987 World's first legislation on organic production
- 1988 Study shows 27 ongoing research projects at 14 different institutions
- 1993 First central research programme in organic farming
- 1995 First Danish Action Plan for Organic Farming
- 1996 Establishment of Danish Research Centre for Organic Farming (DARCOF)
- 1996 11th IFOAM Scientific Conference takes place in Copenhagen, Denmark
- 1996 First coordinated research programme (DARCOF I)
- 1999 Second Danish Action Plan for Organic Farming
- 2000 Second coordinated research programme (DARCOF II)
- 2005 Third coordinated research programme (DARCOF III)
- 2006 Joint Organic Congress held in Odense, with the presentation of results from current European projects

3 Organisation of Danish research in organic farming

In Denmark research programmes with direct relevance for Organic Food and Farming are provided by the Danish Ministry of Food, Farming and Fisheries. The actual funding is generally distributed by the Danish Directorate for Agribusiness - after advice from the "Advising committee on research".

In the case of research in Organic Food and Farming, tasks concerning initiation and coordination of programmes have been entrusted to the Danish Research Centre for Organic Food and Farming (DARCOF). Plans for new research programmes are to be presented for the Advising Committee, who can comment on the initiatives. Likewise, new programmes and other major initiatives regarding Organic Food and Farming are presented for the Organic Food Council, who is advising the Directorate and the Ministry in questions regarding Organic Food and Farming. The overall organisation is shown in figure 1.

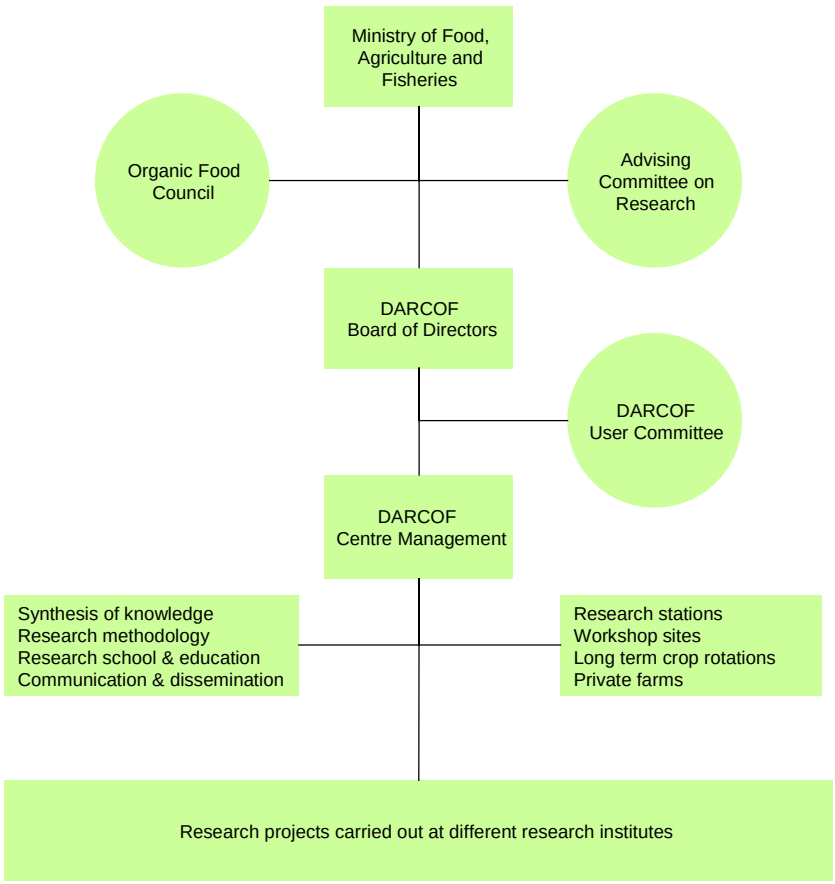

Figure 1: Organisation of Danish research in Organic Food and Farming

The board of directors carries out the overall management of DARCOF. The Minister appoints the regular board members after nomination by the central research institutes (textbox 1), while the chairman of the board is appointed directly by the Minister without any prior nomination. Furthermore, the DARCOF User Committee is represented at the board (see chapter 6 on stakeholder engagement). The obligations of the board include the task of initiating new research programmes and to safeguard the scientific quality of research.

The DARCOF board of directors are represented in the Advising Committee for Research and the Organic Food Council. Links to the homepages of these institutions are available at the DARCOF Homepage[3].

[3] http://www.darcof.dk/links/index.html

Textbox 1. DARCOF Board of Directors

- Chairman appointed directly by the Minister
- 1 member nominated by Centre for Advanced Food Studies
- 2 members nominated by Danish Institute of Agricultural Sciences
- 1 member nominated by Danish Research Institute of Food Economics
- 1 member nominated by National Environmental Research Institute
- 1 member nominated by National Institute for Food and Veterinary Research
- 1 member nominated by Risø National Laboratory
- 2 members nominated by The Royal Veterinary and Agricultural University
- 1 member representing the DARCOF User Committee
- 1 member appointed by the Directorate for Food, Fisheries and Agricultural Business (observer)

Several other research institutes and organisations participate in the DARCOF cooperation, but are not represented at the board of directors. These institutes are listed in textbox 2.

Textbox 2. Other institutes participating in DARCOF research programmes

- Universities and sector research institutes
- Centre for Bioethics and Risk Assessment
- Danish Institute for Fisheries Research
- Danish Institute for International Studies
- Food and Resource Economics Institute
- Technical University of Denmark
- University of Aalborg
- University of Copenhagen
- University of Southern Denmark
- University of Århus
- Organisations and agencies
- Danish Agricultural Advisory Centre
- Danish Aquaculture Organisation
- Danish Bacon and Meat Council
- Danish Food Agency
- Danish Meat Research Institute
- Danish Technological Institute

4 Research programmes 2000 - 2010

In the following, the content and volume of the Danish research programmes in Organic Food and Farming are laid out.The programmes, which were carried out before 2000, are mainly of historical interest, only programmes from 2000 and forward are described.

4.1 Research 2000 – 2005 (DARCOF II)

In the late 1990s, the public interest in organic and sustainable agriculture stimulated the preparation of various national documents (policies) on the subject. For organic farming the most important document was *Action Plan II – Developments in Organic Farming*, which was prepared by the Danish Organic Foods Council to the Minister of Food, Agriculture and Fisheries.

On the basis of the Action Plan it was concluded that research initiatives must take due regard to market demands, while preserving the values associated with organic principles. The remit of DARCOF II, which was initiated in the prolongation of the Action Plan, was thus "*to produce knowledge that can be used to promote increased production and a closer relationship between the inherent and organic qualities of organic foods*".

Key figures for DARCOF II

▪ Title of programme:	Increased production and a closer relationship between inherent and organic qualities of organic foods (DARCOF II)
▪ Duration:	2000 – 2005
▪ Financing:	€ 30 million in total
▪ Research institutes:	20
▪ Number of projects:	34

4.2 Research areas and projects

As it appears from the project portfolio (annex 1), the projects can be listed under six main areas:

I. Crop production, the environment and the quality of vegetables
II. Animal husbandry, health and the quality of livestock products
III. Agriculture and society
IV. Research units and workshop areas
V. Research co-ordination, synergy and education
VI. Seed production and developments

However, the projects listed under each heading are more embracing than the headings might suggest. In the area of crop production, the projects relate to plant production systems, nutrient metabolism, foods quality and safety. The animal husbandry area incorporates projects on livestock production, health and welfare, as well as food quality and safety. For agriculture and society, the projects cover consumer preference, legislation and confidence, society and economics, organic food and human health, nature quality and research within the organic principles. Areas IV and V include projects that are instrumental in the completion of the research projects in the other areas. Finally, area VI contains projects dealing with improvement of seeds and plant varieties, together with research aiming on providing knowledge on how to avoid contamination of organic produce with genetically modified materials. All research results, reports and articles are documented in the Organic Eprints Archive.

4.3 Distribution of funding

DARCOF II is involved in approximately 140 research scientists corresponding to approximately 360 person-years. The total grant amounts to approximately 30 million €. The distribution at the individual projects appears from annex 1. In table 1, the budget is distributed according to the overall subjects areas of Organic Eprints.

Table 1: Budget of DARCOF II distributed according to subject areas

Subject area	Projects	Amount, 1 000 €
1 Farming systems	IV	2 669
2 Animal husbandry	II.1, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10	5 181
3 Crop husbandry	I.1, I.2, I.5, I.6, I.8, I.9, I.10, I.11, I.12, I.14, VI.1, VI.2, VI.3, VI.4, VI.5	10 188
4 Soil	I.7	751
5 Environmental aspects	I.3, I.13, I.15, I.16, III.3, III.5	4 161
6 Food systems	I.4, II.2, II.11, II.12, III.1, III.2, III.4, III.7, III.8	4 343
7 Values, standards and certification	III.9	267
8 Knowledge management	V	2 707
Total		30 267

4.4 Research 2005 – 2010 (DARCOF III)

Key figures for DARCOF III

- Title of programme: International research cooperation and organic integrity [4] (DARCOF III)
- Duration: 2005 - 2010
- Budget: € 27 million in total (2 millions set aside for transnational research)
- Number of institutes: 20
- Number of projects: 15 national projects (transnational projects are expected)

DARCOF III is the new Danish research programme in Organic Food and Farming. Funds for the programme (approximately 27 million € in total) were allocated as part of a parliament decision in 2004 on the so-called "Water Environment Plan III". The programme was initiated in continuation of the DARCOF strategy from 2003, which called for research supporting:

- The integrity and efficiency in the whole organic food chain – from farmer to consumer
- A sustainable development of society as a whole

The programme consists of 15 large projects within the following eight main themes:

- Nutrition, health and food safety
- Processing, quality and consumption of organic products

[4] Integrity can be understood as the ability to act independently, honestly and in agreement with moral principles, but also as the right to exist as a group without being offended by others.

- Development of an efficient primary organic production
- Organic integrity
- Different production systems significance for sustainable development
- Bio-energy as a complement to organic food production
- Regulation and trade
- Organic farming in a global perspective

4.5 Distribution of funding

The total grant amounts to approximately € 27 million. The distribution of the national projects appears in annex 2. In table 2, the budget is distributed accordingly to the overall subject areas of Organic Eprints.

Table 2: Budget of DARCOF III distributed according to subject areas

Subject area	Amount, 1 000 €
1 Farming systems	933
2 Animal husbandry	1 490
3 Crop husbandry	4 400
4 Soil	0
5 Environmental aspects	2 800
6 Food systems	12 064
7 Values, standards and certification	1 533
8 Knowledge management	933
Total	24 800

4.6 Plans for transnational research

In addition to the above numbers approximately € 2 million have been set aside for a common pool for transnational research in Organic Food and Farming. The common pool is part of the DARCOF III programme.

5 Financing

Since 2000, the main part of the Danish research effort in Organic Food and Farming has been carried out through the research programme DARCOF II. As this programme is carried out under the auspice of the Ministry of Food, Agriculture and Fisheries, the Directorate for Food, Fisheries and Agri Business (DFFE) administer the funding for the individual projects in the programme.

Means for funding of research programmes are provided via an account at the Danish Finance Act (§ 24.33.02 - Grants for Research in Food and Agriculture), meaning that major research programmes have to be approved by Parliament. Payments are made annually according to a set of instructions, which among others include annual status reporting and evaluation as a prerequisite for continuing release of funding.

Co-financing by institutes, other authorities or private companies is commonly used in many projects. The expected co-financing will appear from the project application, while the actual

co-financing will appear in the final project report. As average it is estimated that approximately 25 % of the total programme are co-financed. Table 3 provides an overview of the distribution of funding of the research programme.

5.1 Funding of development activities

The Directorate for Food, Fisheries and Agri Business is also coordinating the Danish programme for business innovation, which provides funding for development of products and processes in small and medium size enterprises (SMEs).

Research institutes can apply to the programme in cooperation with a private company. However, as the private company has to carry the main part of the overall expenditure, the programme has primarily resulted in innovations rather than regular research. A comparable programme called "grassroots research" focuses on innovations on organic farms. This programme has mainly been utilised by organic farmers, who seek to develop their production.

Finally, the "Foundation for Organic Farming" was established in 2004, by means of a parliamentary decision. The objective of the foundation is to strengthen business possibilities within Organic Food and Farming. Emphasis has thus been on product developments, marketing etc.

Table 3. Estimated annual research funding for Organic Food and Farming (million € per year)

	2000 – 2004	2005 - 2009
Research programmes (DARCOF)	5.5	5.3
Co-financing of research programmes	1.4	1.1
Other public R&D	2.0	2.0
EU-funding	0.1	1.0
Total	9.0	9.4

6 Research facilities

During the first years of DARCOF's existence several organic research facilities were setup to provide opportunities for conducting different projects simultaneously, using the same research fields, herds, etc. As researchers from different research environments cooperate in DARCOF, the use of common facilities may stimulate interdisciplinary collaboration, synergy and complementary research. The main facilities are described below.

6.1 The organic research station Rugballegaard[5]

At Rugballegaard near Bygholm Research Centre, a research station has been established to investigate organic animal production and the interactions between animal husbandry and crops on a large area of land. Rugballegaard covers an area of 140 hectares, its stock comprising 60 dairy cows, with followers and about 60 sows, for the production of slaughter pigs. The farm has been authorised for organic farming since 1996 and several new research buildings have been built for the housing of animals. Financing of these facilities is provided by the Danish Institute of Agricultural Sciences (DIAS).

5 The Organic Research Station Rugballegård, http://web.agrsci.dk/jbt/Rugballeg_uk/index_uk.shtml

6.2 Research farms at KVL

One of the research farms at the Danish Agricultural University (KVL)[6], Bakkegaarden, is dedicated to organic farming. It has been converted in 1999-2000 and covers about 48 hectares. On another of KVL's research farms there are areas for studying different organic cropping systems and an organic workshop site, running since 1988. Financing of these facilities is provided by KVL.

6.3 Crop rotation trials

Long-term organic crop rotation trials have been performed since 1996 on four locations: Jyndevad, Foulum, Flakkebjerg and Holeby[7]. The crop rotations have different proportions of legumes, cereals and cash crops. They are carried out on different soil types and with different levels of manure. The aim of these trials is to investigate how the type of rotation affects yields, nutrient balances, weed and disease problems, as well as soil fertility. Financing of these facilities is provided by DARCOF II (Project IV).

6.4 Organic workshop sites

Organic workshop sites for research, which cover a total of 55 hectares, have been setup at Flakkebjerg, Aarslev and Foulum research centres and at Jyndevad and Askov research stations. These sites have all been managed according to organic principles since 1996 and some were converted as early as 1987. They are principally dedicated to plant production investigations. At these sites, it is possible to conduct analytical studies that require different soil types and climatic conditions. Furthermore, a part of the long-term fertiliser trials on Askov, which have been running since 1893, has been converted to organic farming in 1998. Financing of these facilities is provided by DARCOF II (Project IV).

6.5 Farm studies

Finally, agreements have been drawn up with private organic farmers who make their farms available for research in relation to different projects. Expenses for farm studies are covered by the individual projects undertaking such activities.

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6 The Royal Veterinary and Agricultural University (KVL), Centre for Ecology and Environment (CENVIR), http://www.agsci.kvl.dk/coem/English/ukintro.html

7 See also Djurhuus, Jørgen und Olesen, Jørgen E. (2000) Characterisation of four sites in Denmark for long-term experiments on crop rotations in organic farming. DIAS report Nr. 33, Danish Institute of Agricultural Sciences. Archived at http://www.orgprints.org/1814/

7 Initiation of research and stakeholder engagement, prioritised research needs in DARCOF III

A major argument for establishing DARCOF, as a coordinating centre for Danish research in Organic Food and Farming, was to secure the coordination between the policy level, the organic associations and other stakeholders as well and relevant research institutes.

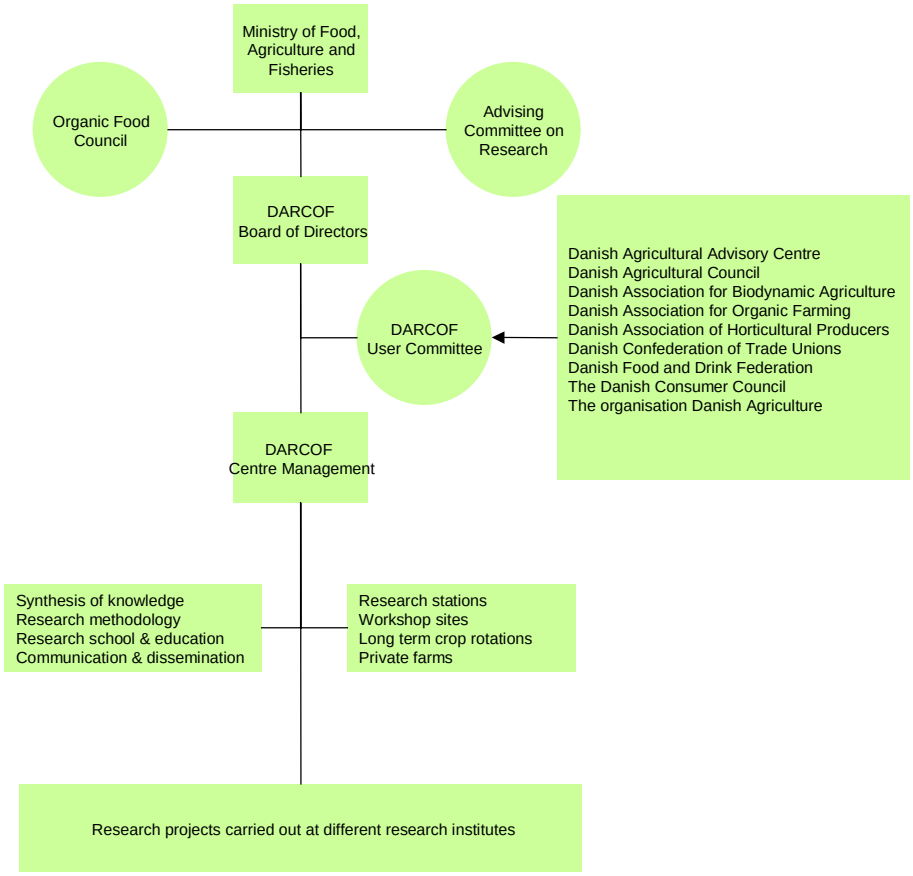

Figure 2: User representation in the Danish organic farming research system

The organisation of DARCOF includes a board of directors, which are appointed by the Ministry of Food Agriculture and Fisheries (see chapter 2). Thereby, the Board is responsible for initiating and implementing the research in accordance with the policy of the Government. To ensure the relevance of the research activities, including contact with the various user groups, a user committee has been appointed with representatives from professional organic associations, NGOs, etc. The User Committee advises the Board in all relevant matters and the main obligation is to ensure that the research initiated in DARCOF is relevant for users (foremost organic farmers and manufactures) and that research results are mediated to the relevant user groups. However as shown in figure 2, also other stakeholders can influence the decision process above the Board of Directors. The Organic Food Council advises the Ministry in all matters concerning Organic Food and Farming. The Advising Committee on Research advises the Ministry in all matters concerning research.

7.1 Initiation of research programmes

Very often, major research programmes have their own unique story of origin, as they are influenced by political and societal discussions, new technological possibilities etc. However, in the case of research in Organic Food and Farming, some typical phases can be identified (Table 4).

In the following chapters, the main phases are described further.

Table 4: Typical phases in initiation of research programmes

	Involvement of stakeholders	Involvement of board of directors
Public discussion on research needs	+++++	++
Governmental action plan or policy paper	+++++	+
Preparation of DARCOF strategy or guiding principles	++++	+++++
Call for expressions of interests	+++	+++
Call for project applications	+	+++++
Evaluation of research quality		+++++
Final selection of projects	++	+++++

+ Low degree of involvement

+++++ High degree of involvement

7.2 Public discussions and preparation of action plans

Prior to both DARCOF II and I the Danish Ministry of Food, Farming and Fisheries asked the Danish Organic Council to prepare action plans with suggestions for the overall development of organic farming in Denmark. In both action plans, research was seen as the pre-requisite for further development of the organic form of production, but also as an important tool for society as a whole to meet targets of environmental and social sustainability, healthy, high-quality foods and better animal welfare.

As the Organic Council and the DARCOF User Committee represents the same stakeholders, the involvement of the User Committee has also been high.

7.3 DARCOF strategy and expressions of interests

Prior to the DARCOF research programmes DARCOF has prepared documents (strategy or guiding principles) highlighting the research needs and challenges in relevant areas of Organic Food and Farming. In order to get ideas from all interested research communities on how to meet the challenges, a call for expressions of interest has been put out. Concerning DARCOF III, which has recently been implemented, the complete strategy can be seen at the FOEJO website[8]. The call for expressions of interest can be seen at the OKOFORK homepage[9], which serves as an internal communication tool for all researchers involved in DARCOF projects.

[8] Forskningscenter for Økologisk Jordbrug: Strategioplæg 2005 – 2010. Internationalt forskningssamarbejde og økologisk integritet. http://www.foejo.dk/debat/strat19sep03.pdf

9 Forskningscenter for Økologisk Jordbrug: Oplæg til ny forskning I økologisk jordbrug og økologiske fødevaresystemer 2005-2010 (FØJO III). Internationalt forskningssamarbejde og økologisk integritet. Available at http://www.okoforsk.dk/funktion/koor/nyforsk/indkald_juli04.pdf

7.4 Call for project applications, prioritised research needs in DARCOF III

Based on the policy need and the most prospective ideas given by researchers in the expressions of interests, a call for project applications is prepared. In contrast to the call for expressions of interest, the call will be quite precise in stating the prioritised research needs and the specifications needed in the applications. In DARCOF III, the call was specified so it could correspond to one single project within the following themes, in total 16 topics (number is shown in brackets):

- Nutrition, health and food safety (1)
- Processing, quality and consumption of organic products (6: Dairy products, meat and eggs, fish, vegetable products, cereal products, consumers study of demand)
- Development of an efficient primary organic production (2: Utilisation of grass clover, intelligent weed management)
- Organic integrity (2: natural sources of vitamins and minerals, organic seeds)
- Different production systems significance for sustainable development (2: Production systems, biodiversity)
- Bio-energy as a complement to organic food production (1)
- Regulation and trade (1)
- Organic farming in a global perspective (1)

In order to enable the formation of joint project applications and project groups involving researchers from different research environments, the individual expressions of interest are put on DARCOF website. The complete call, with the deadline of 15 March 2005 is available at the Okoforsk homepage[10].

7.5 Evaluation of quality and selection of projects

In DARCOF II, an international evaluation of research quality in the individual projects was executed by DARCOF. According to the change of the rules for the Danish Research Council System in 2004, the Danish Research Agency must now perform an independent evaluation of the scientific quality of all major research programmes. A programme committee appointed by the Danish Council for Strategic Research performs this evaluation – very often by help from international experts.

The final selection of projects can only be done among projects that have been quality approved by the Danish Research Agency. The selection is done by the DARCOF board of directors by advice from the User Committee. The relevance of the research project for Organic Food and Farming, the proven research skills of the applicants (especially the project leader) and the possibility for achieving optimum benefit from the allocated resources, are some of the criteria used.

7.6 Areas of dispute

When initiating DARCOF II, the expressions of interest in some central areas were so diverse and incoherent that it was not possible to initiate research projects directly in the above manner. This was especially the case of organic pig production, quality of nature, protection of ground water, food quality and human health, quality of organic plant breeding and seed production, as well as the possibilities for an organic production free of genetically modified organisms (GMOs). For in-

[10] Forskningscenter for Økologisk Jordbrug : Ny forskning i økologisk jordbrug og økologiske fødevaresystemer 2005-2010; http://www.okoforsk.dk/FoejoIII/Foejo%20III%20oplaeg.pdf

stance, there were very different expectations as to which production systems would prevail in future organic farming – something that is quite decisive for the initiation of research.

In these areas, knowledge syntheses were performed during the year 2000. In short, a knowledge synthesis analyses, discusses and synthesises the existing knowledge on a not clarified, and often disputed subject in relation to the main points of view. The work takes place in a group of experts from different fields, representing the different points of view on the subject. An important aim of the knowledge synthesis is to create mutual understanding among the experts with a view to future research and the development of organic farming.

8 Selection criteria and evaluation procedures

In the following, the common criteria for selection of projects are described together with a description of the procedures used for annual and mid-term evaluation of individual projects.

8.1 Selection of projects and research teams

Both DARCOF II and III were established on the basis of expressions of interest from the research community. In textbox 3, the common criteria for selecting research groups and projects are shown.

Textbox 3.
Common evaluation criteria

I. Fulfilment of the general objectives for the overall research effort and adequate coverage of specific research areas
II. The short- and long-term relevance for organic farming - and the potential relevance for conventional farming
III. Contribution to the internationalisation of research, including participation in formalised research cooperation
IV. An assessment whether the project objectives can be fulfilled within the suggested time schedule
V. The relationship between the benefits of the expected results and the estimated expenditure
VI. The scientific background, experience and technical competence of the applicants
VII. The desires for focused and long-term build-up of knowledge, including development of specific competence on participating institutes
VIII. Continuity in research, including synergy and coherence with existing and concluded research
IX. Contribution to education of researchers and mediation of results nationally and internationally
X. General quality, news value and potential for innovation

8.2 International evaluation of applications

As a means to further secure the scientific quality of the research, all project applications for DARCOF II undertook a thorough evaluation by external, international experts, whose criticisms were decisive for determining to which extent a project could be conducted (see textbox 4 for the criteria used for the evaluation).

This evaluation was conducted by DARCOF. The rules for the Danish Research Counselling System have later been changed, meaning that the Danish Research Agency at the present day must perform evaluations of all new major research programmes.

The consequence of this change of rules was that experts appointed by the National Research Agency evaluated all project applications for DARCOF III.

Textbox 4.
Criteria for international evaluation of applications for research in organic farming

Project as whole

- Scientific quality (problem identification and –reduction (as given in the introduction, state-of-the-art objective), project organisation and suggested time schedule etc.)
- Contribution to over all objectives of DARCOF II
- Competence of the applicants (in particular the project leader)
- Suggestions for cutting the project budget with approximately 25%:
- Important aspects not included

Individual work packages

- Scientific quality: materials, methods, conduction etc
- Are the proposed budgets appropriate with the expected achievements?
- Other remarks

8.3 Monitoring progress in ongoing projects

One of the key activities of DARCOF is to coordinate, evaluate and manage the research projects in accordance with the overall objectives of the whole research effort. This is done by means of the following management activities:

- Continuing dialogue with the project leaders in order to ensure that the individual projects are conducted according to plans and, if necessary, ensure that plans are changed
- Conducting a critical evaluation of annual status reports in dialogue with the project leaders
- Motivating maximal publication and communication activity, partly through annual status report meetings (planning, follow-up and adjustment) and partly through external meetings and information
- Avoiding unnecessary overlap between projects
- Striving for the greatest possible synergy in the allocation of resources
- Encouraging the review and evaluation of research findings in both national and international forums
- Recalling / reallocating resources in cases where the returns do not live up to the expectations

The management is conducted on the basis of an annual status report accounting for project results and progress. This includes an overview on the fulfilment of the following: task, deliverables and milestones, a description of deviations and adjustments of plans, changes in budgets, staff etc. and a list of project publications and other products. Finally, the project leader is asked to provide a "critical reflection on the project".

Based on the status report, the DARCOF Centre Management meets with the project leader and senior researchers in order to discuss results and plans for the projects. After the meeting, the

DARCOF Centre Management can approve the status report or changes to the project can be suggested. Continuation of the project (continuing funding) can only be authorised, when the DARCOF Centre Management has approved the status report. Furthermore, the status report provides the foundation for the international mid-term evaluation of the research quality that typically is performed.

9 Utilisation of research

One of the objectives of the DARCOF Centre is to provide an overview of the research and to disseminate the research findings to relevant user groups. On this background a number of tools and activities, which intends to provide opportunities for utilising the research, has been established.

9.1 Mediation of research

Comprehensive information including descriptions of all the individual research projects in DARCOF, their findings and publications can be found at both the Danish[11] and the English[12] internet site of DARCOF. The sites make full use of the Organic Eprints Archive, which holds most Danish papers related to research in organic agriculture.

In relation to the websites, electronic newsletters are issued. The newsletters are available both in Danish and in English[13] and they provide easily accessible information on new research results, new research developments, new publications, theme days, workshops, field walks, etc.

Most research results are published in scientific journals, but DARCOF issues a number of reports, proceedings, reviews, etc. together with bi-annual reports on its research activities. One of the objectives for the reports is to provide a comprehensive view on the research and its results.

DARCOF has agreements on regular columns and articles in periodicals directed at farmers. The articles bring news on research and research findings.

9.2 Dialogue and interaction

It is important to provide opportunities for direct dialogue and interaction between researchers and the various groups interested in organic farming. An important forum for this dialogue is the DARCOF User Committee, who has the opportunity for initiating debates and discussion on specific subjects. Examples are discussions on the fundamental principles and values of the organic movement and analyses the use of different technologies in Organic Food and Farming processing.

On a more regular basis, DARCOF organises theme days and workshops on chosen subjects; for example in connection with knowledge synthesis and initiation of new research activities. On a bi-annual basis the Danish Organic Congress is held by DARCOF and three other organisations. One of the ambitions of the congress is to be a joint forum for all working professionally on Organic Food and Farming. In 2006, the Danish Organic Congress is gaining a European dimension ("Joint Organic Congress") by providing a platform for researchers from Europe an other parts of the world to present their results[14].

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[11] Forskningscenter for Økologisk Jordbrug (FØJO = DARCOF), DK-Tjele, www.foejo.dk
[12] Danish Research Centre for Organic Organic Farming; www.darcof.dk
[13] DARCOF-E-news: http://www.darcof.dk/enews/mar03/about.html
[14] Information on the Joint Organic Congress is available at www.organic-congress.org. The papers submitted to that congress are available at http://orgprints.org/view/projects/int_conf_joint2006.html

Since 1999, "organic field walks" have been organised each summer, where interested farmers, advisers etc. are invited to visit the organic workshop sites, crop rotation trials and the research farms. Furthermore, in collaboration with the national advisory service, the organic workshop sites and the crop rotations are utilised as forums for education of organic advisors etc.

Finally, DARCOF has prepared several exhibitions on the research and it has participated in TV-programmes and other media productions.

10 Scientific education & research schools

One of the main objectives for DARCOF is to "contribute to the education of research scientists involved in the projects". In order to fulfil this objective, several activities have been undertaken.

10.1 Post-graduate research school in organic farming

In the spring of 2001, the Royal Veterinary and Agricultural University (KVL) in cooperation with DARCOF established a post-graduate research school in Organic Food and Farming. The purpose of "The Research School for Organic Agriculture and Food Systems (SOAR)"[15] is to strengthen the quality of research education in organic farming.

The school offer scientific courses as well as a network environment for post-graduate students in organic agriculture. The students are encouraged to interdisciplinary and wholeness-oriented work. Moreover, the school aims to reinforce the cooperation of students and supervisors in and across institutions.

10.2 Training of researchers

A wide variety of Bachelor, Master and Ph.D. studies are included in DARCOF's research projects. To further strengthen the education of researchers with qualifications in organic farming, DARCOF offers supplementary funding of PhD students in relevant areas. In DARCOF III, it is expected that each of the 15 projects will attach at least one PhD student.

10.3 Scientific workshops

Under the auspice of DARCOF, scientific workshops on a variety of technical aspects of organic farming are also convened. These workshops have different objectives, but generally they focus on the presentation and discussion of pressing problems in particular areas and the formulation of research strategies for making progress in these areas.

10.4 Bachelor and Master of Science programmes

The Royal Veterinary and Agricultural University in Copenhagen (KVL) offers a wide range of possibilities for scientific education within agriculture, horticulture and related topics. However, there are neither Bachelor nor Master of Science programmes aimed specifically at Organic Food and Farming. Likewise a professorship established in 1996 as a supplement to DARCOF I was abolished in 2000. Instead, students are offered the possibility of joining courses within specific areas of Organic Food and Farming.

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15 Research School for Organic Agriculture and Food Systems; http://www.kursus.kvl.dk/shares/soar/

11 Annex

11.1 Annex 1: Budget for DARCOF II projects

I	Crop production, environment and food quality	1 000 €	1 000 DKK
I.1	Organic production of cucumber and tomato	627	4 700
I.2	Sustainable production systems for apples	313	2 350
I.3	Nitrogen dynamics, crop production and biodiversity	1189	8 915
I.4	Enhanced bread wheat production	876	6 570
I.5	Production of grain legumes and cereals	876	6 570
I.6	Cultivation in ridges and mixed cropping	627	4 700
I.7	Soil quality in organic farming	751	5 631
I.8	Management of perennial weed species	313	2 350
I.9	Band heating for intra-row weed control	627	4 700
I.10	Organic vegetable cultivation methods	1 503	11 270
I.11	Cultivation of org. clover and grass seeds	501	3 755
I.12	Preventing mycotoxin problems	513	3 851
I.13	Dinitrogen fixation and nitrous oxide losses	488	3 660
I.14	Control of scab in organic apple growing	289	2 170
I.15	Nitrate leaching from dairy farming	133	1 000
I.16	Regional groundwater protection	400	3 000
II	**Animal husbandry, health and food quality**		
II.1	Organic dairy production systems	1 207	9 050
II.2	Prod. of organic milk of high quality	267	2 000
II.3	Production of steers and bioactive forage	876	6 570
II.4	Health and welfare for organic calves	400	3 000
II.5	Use of antimicrobials	213	1 600
II.6	Research in poultry production systems	751	5 630
II.7	Improved pig feed and feeding strategies	667	5 000
II.8	Health management in organic pig prod.	333	2 500
II.9	New systems in organic pig production	467	3 500
II.10	Bacterial infection risk – pig production	267	2 000
II.11	Production of raw milk cheese	367	2 750
II.12	Product quality of organic beef and pork	103	770
III	**Agriculture and society**		
III.1	Consumer demand for organic foods	564	4 230
III.2	Analyses of the future development	751	5 630
III.3	Closing the rural-urban nutrient cycle	751	5 630
III.4	Organic food and health	1 048	7 860
III.5	Nature quality in organic farming	1 200	9 000
III.7	Future supply and marketing strategies	160	1 200
III.8	Distribution channels for organic foods	207	1 550
III.9	Organic agriculture in social entirety	267	1 999
IV	**Experimental units for research**	2 669	20 020
V	**Coordination, synergy and education**	2 707	20 300
VI	**Breeding and production of GMO-free seeds**		
VI.1	Healthy seed – cereals and legumes	1 333	10 000
VI.2	Characteristics for spring barley varieties	1 393	10 450
VI.3	Tools for protection against cont. by GMO	293	2 200
VI.4	Grain legumes for organic farming	713	5 350
VI.5	Vegetable and forage seed	267	2 000
Total		**30 267**	**226 981**

11.2 Annex 2: Budget for DARCOF III projects

No.	Themes and projects	1 000 €	1 000 DKK
I	Nutrition, health and food safety		
I.1	Content and bioavailability of essential trace elements and bioactive compounds in cereals and vegetables cultivated in four diverse organic agricultural systems	1 867	14 000
II	Processing, quality and consumption of organic products		
II.1	Organic milk of high quality - development of production concepts based on grazing of the dairy cows and gentle treatment of the milk during handling and processing	1 867	14 000
II.2	Quality and integrity of organic eggs, chicken meat and pork	1 867	14 000
II.3	Organic aquaculture: the linkage between sustainable production and superior products	933	7 000
II.4	Organic cropping systems for vegetable production, product quality, natural regulation and environmental effects	1 800	13 500
II.5	The viability and stability of demand: the future outlook for the organic market in Denmark	1 333	10 000
III	Development of an efficient primary organic production		
III.1	Grass-clover in organic dairy farming: options to reduce costs and improve nutrient utilisation	1 867	14 000
III.2	Effective control of perennial weeds and intra-row weeds in organic cropping through novel technology and new management strategies	1 600	12 000
IV	Organic integrity		
IV.1	Increased integrity in organic dairy production through natural sources of vitamins and minerals and non-antibiotic health control	1 493	11 200
IV.2	High quality seed: maintaining integrity in organic farming	933	7 000
V	Different production systems significance for sustainable development		
V.1	The effect of cropping systems on production and the environment	1 867	14 000
V.2	The role of organic farms as refuge for biodiversity	933	7 000
VI	Bio-energy as a complement to organic food production		
VI.1	Biomass and bio-energy production in organic agriculture – consequences for soil fertility, environment, spread of animal parasites and socio-economy	1 867	14 000
VII	Regulation and trade		
VII.2	Public policies and demand for organic food: An international comparison of policy effects and policy determinants	933	7 000
VIII	Organic farming in a global perspective		
VIII.1	Sustainability of organic farming in a global food chain perspective	1 507	11 300
Others	Common pool set aside for a transnational research programme	2 000	15 000
	Knowledge management, mediation and communication	1 000	7 500
	Co-financing of EU research projects	1 000	7 500
Total		26 667	200 000

CORE Organic Country Report

Report on Organic Food and Farming in Finland

April 5, 2006

Prepared by:
Ministry of Agriculture and Forestry, Agri-Food Research, Department of Agriculture
Arja Nykänen and Markku Järvenpää

Contents

1 History

Traces of the first form of organic agriculture, Natural Agriculture of the Life Reform Movement, can also be found in Finland in the 1910s. First experiments with biodynamic farming were carried out and the first farm was started in 1927. The Finnish Biodynamic Society was founded in 1946. Biochemist and Professor A.I. Virtanen can, however, be considered as the pioneer of organic farming of Finland. During the 1930s, Virtanen developed the AIV-System, a cultivation method that included crop rotation with intensive red clover leys and pastures and bread grains. Silage was made of clover based leys using a new method, where the idea was to decrease the acidity of the clover silage rapidly to under pH 4 with mineral acids in order to preserve the silage properly. Professor Virtanen was awarded with the Nobel Prize of chemistry in 1945 for this ingenious method, on which the silage making in northern conditions is still founded. At his time, Professor Virtanen was known as one of the world's leading biochemists and especially as researcher of biological nitrogen fixation.

The interest in research on organic farming grew in the beginning of the 1980s. In 1980, an extensive seven-year-project started in cooperation between several institutions investigating the possibility to improve the efficiency of nitrogen fixation and utilisation of nitrogen fertilisers and cow manure. Two extensive comparative projects began in 1982: (1) conventional and organic cropping systems at Suitia, University of Helsinki and (2) self-sufficient crop rotation and cropping system by the Agricultural Research Centre of Finland at its regional research stations.

In September 1985, the Partala Centre for Rural Development for research on organic farming was founded in Juva. The University of Helsinki, Juva municipality and some other organisations belonged to this Partala association, as it is called nowadays. Partala experimental farm was integrated into the MTT Agricultural Research Centre of Finland in 1990. MTT Partala and Karila in nearby town Mikkeli were joined together in 1996 to the MTT Research Station of Ecological Production. Partala research station and later MTT/Ecological Production has coordinated research on Organic Food and Farming in Finland since 1990. It has launched three research programmes, which have covered the whole organic sector from soil issues to food processing and markets, as well as social issues. Professor Artur Granstedt from Sweden was nominated as professor for organic farming research in Partala for 5 years in 1993, and he influenced strongly the research programmes of Organic Food and Farming at that time.

MTT Ecological Production established 'The Finnish Research Network on Organic Agri-Food Systems' (ReNOAF), together with other stakeholders in 2000 and has coordinated this network ever since. Funding directed especially for research programmes on Organic Food and Farming (OF&F) was addressed for the first time in Finland in 2003, when the Ministry of Agriculture and Forestry launched its first research programme on Organic Food and Farming, based on the priorities prepared in the ReNOAF. National research seminars were also organised by MTT Ecological Production.

The Partala Research Station will be closed down in September 2006. The lands of the Partala Research Station will remain under organic farming research, but all personnel will move to the Mikkeli Research Station to work in close connection with the Ruralia Institute of the University of Helsinki. The reason for this decision was to improve efficiency by having a better critical mass of researchers by putting more people to work together and by concentrating the resources.

At the University of Helsinki, the Mikkeli Institute for Rural Research and Training (Ruralia Institute Mikkeli Unit), a neighbour of MTT Ecological Production, got started in 1988. Organic production has been one of its priorities from the very beginning. It has concentrated on further training and development activities. It has, for example, educated all advisors and teachers for organic farming since 1991. Developing activities have covered the processing and marketing of food, plant protection and animal welfare. In 2000, the only academic educational programme for Organic Food and Farming was started there. This Eco Studies – project (see Chapter 9) has been under way at the Ruralia Institute Mikkeli Unit of the University of Helsinki since 2001. The project consists of scientific

research and university level study entities. Studies in the organic agri-food systems study programme are available for university students and through the Open University for all who are interested in the field. It provides opportunities to join the European and Nordic study programmes, too.

Organic production, marketing and consumption of organic products are also studied in Finland at the other departments of the MTT Agrifood Research and University of Helsinki, the University of Joensuu, the National Consumer Research Centre, the VTT Technical Research Centre, the National Veterinary and Food Research Institute and the Work Efficiency Institute.

Milestones in Finnish Organic Food and Farming research

- 1910 First experiments in Organic Food and Farming
- 1985 Partala Centre for Rural Development for research on organic farming established
- 1988 Mikkeli Institute for Rural Research and Training got started
- 1990 Partala integrated into the Agricultural Research Centre of Finland MTT
- 1991 Research Programme on Organic Production of the Agricultural Research Centre of Finland started, running 1992-1995
- 1993 Professor Artur Granstedt was nominated a professor for organic farming research in Partala for five years
- 1994 Updating of the Research Programme for 1995-1997
- 1997 Research Programme on Organic Food and Farming 1998- 2002
- 2000 The Finnish Research Network on Organic Agri-Food Systems established
- 2000 Eco Studies – project, the only academic educational programme for Organic Food and Farming started
- 2003 Research Programme on Organic Food and Farming of the Ministry of Agriculture and Forestry started
- 2004 Professorship for animal welfare established by the Department of Clinical Veterinary Medicine and the Ruralia Institute of Helsinki University
- 2005 Professorship for ecological plant production established by MTT Mikkeli and Ruralia Institute of Helsinki University

2 Overview of organic farming in Finland

Organic farming started in Finland already in the 1910s, but organic acreage was very small until the early 1990s, when the Ministry of Agriculture and Forestry first started subsidizing farmers for conversion to organic farming. Today 7 % of the Finnish arable area is certified organic area, which totals 148,000 hectares. It is noteworthy that this is all arable land and almost 40% is under cereals. This results in a relatively high production of organic cereals in Finland, especially oats. Finland is the largest source of organic oats in Europe. In 2004, the average organic area (including conversion area) per farm was 33.2 hectares. The average size of organic farms is thus five percent larger than the average size of all farms in Finland.

About 45% of the organic farms practice animal production. Therefore, it is quite surprising that there were only 386 farms with certified organic animal production in 2004. There are two main reasons for this: converting the animals to organic production is not a prerequisite for the conversion or for receiving production aids for organic farming, and the market for organic animal products is still quite undeveloped. In 2005, a new payment scheme for organic animal farms was introduced, which led to a clear increase in the number of organic animal farms.

In 2004, 47% of the certified animal farms had dairy cows, 40% beef cattle, 12% sheep or goats, 14% poultry and 4% pigs. Egg production is increasing rapidly at the moment, while there is still very little pork production.

In 1990, the first dairy started to process organic milk, and in 2005, four dairies were processing organic milk. The product range includes low fat milk, cheese, yoghurt, cream and - also popular – traditional Finnish sour milk products. Organic meat markets have been the most difficult to establish. Price premiums are low and even the supply has been very small so far.

The organic food market is relatively well-developed, representing a Western European average level where the market share of organic food is estimated at about 1.5%. Most of the organic food is sold through mainstream supermarkets.

2.1 Organisation

2.1.1 MTT Agrifood Research Finland

MTT Agrifood Research Finland is the largest research institute in Finland and one of the largest institutes in the Nordic countries, carrying out agricultural and food research, plus economic and environmental research related to agriculture. MTT Agrifood Research Finland is an expert body operating under the Finnish Ministry of Agriculture and Forestry. It produces and disseminates scientific research information, as well as develops and promotes the transfer of new technology for the agriculture and food sector as a whole.

Ecological Production Research Unit

Research on organic production at the **Ecological Production Research Unit**[1] focuses on nutrient economy and production techniques. Research on local food and the recycling of nutrients promotes the sustainability of food economy. The research topics include nutrient management with a focus from soil ecology to the field scale, farm and food system levels, cultivation techniques for arable and horticultural crops, legume based grassland farming, environmental effects and marketing of Organic Food and Farming.

Agricultural Engineering Research Unit

The Agricultural Engineering Research Unit[2] deals with the technology of organic farming. Typical fields of research are the replacement of environment, stressing technologies by environment supporting and appropriate technologies. Emphasis is laid on support of practical farming by development and adoption of technology according the objectives of organic farming principles. Tests and verification are carried out through the application of new technology on the organic fields of the Agricultural Engineering Research Farm “Kourla”. In animal production, both new buildings and adoption of old production buildings are studied to meet the needs of animal welfare and landscape architecture, in accordance with organic farming principles.

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[1] MTT Agrifood Research Finland, Ecological Production, Arja Nykänen, FIN - 50600 Mikkeli
http://www.mtt.fi/english/research/environment/ecological.html

[2] MTT Agrifood Research Finland, Agricultural Engineering Research, Dr. Winfried Schäfer, FIN - 03400 Vihti, .
http://www.mtt.fi/english/research/technology/mat.html

Animal Nutrition

Animal Nutrition Research[3] is focused on the use of grass as ruminant feed, grass silage, supplementary feeding and nutritional physiology of both ruminants and monogastrics. The study of animal behaviour and the production environment is on the increase as well.

Swine Research

Swine Research[4] focuses on the nutrition, feeding and management of pigs. The nutritional value of different types of feeds and study of the nutritional requirements of pigs at different stages of production is evaluated. The Unit also investigates the effects of nutrition and feeding on gut health and meat quality of pigs and studies how management influences the performance, as well as behaviour of pigs. Pig nutrition research supports the development of pig breeding methods.

Economic Research

Economic Research[5] produces and disseminates scientific economic research related to organic farming, commodity markets, corresponding agricultural and environmental policies. Organic farming has been studied by employing the farm accountancy data from the Finnish FADN network. Learning effects related to the adoption of organic farming technology have been investigated. Studies have given insight into technical efficiency and environmental friendliness of the organic farming strategy compared to conventional farming. For comparison of eco-efficiency, variables capturing both positive and negative environmental impacts of farming practices, such as indicators for biodiversity and excessive nutrient surplus, have been used. Furthermore, an environmental economic modelling tool, entitled *Regional Agro-Economic Model* (RegAE), has been developed for examining the links between economy and the environment in organic production. Implications for agri-environmental policies adopted have been identified. On commodity markets, interaction and functionality of the food chain have been investigated with a special emphasis on municipal decision makers´ and consumers´ understandings of and attitudes to organic food. Quality and responsibility issues, as well as alternative food chains such as local and organic foods have been studied.

Plant Protection Research

Plant Protection Research[6] concentrates on harmful diseases, pests and weeds in organic production. National weed surveys have been made both in spring cereals and on pea plantations. Biology and control of perennial weeds (e.g. *Cirsium arvense, Sonchus arvensis, Elymus repens*) have been studied to meet the requirements of organic production, too. Potato late blight (*Phytophthora infestans*) as the most serious potato disease has been studied with the aim of controlling this with cultivation strategies and bio-control. The severity, prevalence and possible ways for bio-control of pathogens affecting red clover, such as *Fusarium* and *Sclerotinia* have also been studied. The risk of pea moth (*Cydia nigricana*) infestation has been evaluated by modelling field survey data.

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3 MTT Agrifood Research Finland, Animal Nutrition Research, Dr. Marketta Rinne, FIN - 31600 Jokioinen, http://www.mtt.fi/english/research/animprod/animnutrition.html

4 MTT Agrifood Research Finland, Swine Research, Kirsi Partanen, FIN - 05840 Hyvinkää http://www.mtt.fi/english/research/animprod/pigs.html

5 MTT Agrifood Research Finland, Economic Research, Dr. Anni Huhtala, FIN-00410 Helsinki, http://www.mtt.fi/english/research/economic/economic.html

6 MTT Agrifood Research Finland, Plant protection Research, Dr. Jukka Salonen, FIN - 31600 Jokioinen, http://www.mtt.fi/english/research/plants/plantprot.html

2.1.2 University of Helsinki

Ruralia Institute in Mikkeli

The main focus of the Ruralia Institute in Mikkeli[7] is to give education and courses at the university level. This teaching is strongly supported by the research activities of the Unit. Priorities in the research strategy of the unit are: 1) Sustainability discourses, sustainability as a methodological challenge, 2) sustainable food systems, 3) learning citizen-consumers and 4) welfare of production animals.

Department of Animal Science at the Faculty of Agriculture and Forestry

The Department of Animal Science at the Faculty of Agriculture and Forestry[8] focuses on animal breeding and animal nutrition research. The field of animal nutrition covers research from feed production and nutrition physiology to composition and quality of animal products. Animal welfare and environmental issues have connections to the nutrition research strategy. Research related to organic animal production has been carried out in several research projects.

Section for Animal Hygiene at the Faculty of Veterinary Medicine

The Section for Animal Hygiene at the Faculty of Veterinary Medicine[9] has been working with issues related to farm animal ethology and welfare since the 1980s. The research field has grown rapidly since the mid-1990s, resulting e.g. in the establishment of the Research Centre for Animal Welfare, which is a multidisciplinary research group with members from different departments and faculties at the University of Helsinki. The group focuses on issues like ontogeny, environmental enrichment, rest and sleep, as well as challenges in modern production systems. As animal welfare is a central value in organic animal husbandry, many of the projects relate directly or indirectly to organic animal production. The focus on organic farming grew in 2004, when a new 4-year professorship was established at the Department of Clinical Veterinary Medicine, in cooperation with the Ruralia Institute in Mikkeli (part of the University of Helsinki). This professorship is on animal welfare, with special focus on organic animal production and with farm animal ethology as a central scientific theme.

Some of the activities of the Faculty of Veterinary Medicine take place on the Saari estate[9] located in Mäntsälä. The rural environment of the Saari Unit is ideally suited to practical instruction on food animals. The Unit interacts closely with the surrounding community and provides it with the latest scientific information. Research conducted at the Unit focuses on food animals. The largest research group is studying mastitis, while the research group examining the reproduction and longevity of pigs has obtained more external funding than any of the other groups. Other topics of research include the respiratory diseases and limb disorders of ruminants, as well as other infectious diseases. In addition, smaller, active research groups are studying equine and cattle reproduction and sperm. The Unit also studies the health of animals in organic production.

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[7] Helsinki University, Ruralia Institute, Mikkeli Unit Dr. Jouni Kujala, Lönnrotinkatu 3-5, FIN - 50100 Mikkeli Finland, www.mtkk.helsinki.fi/english/eng_index.htm

[8] Helsinki University, Faculty of Agriculture and Forestry, Department of Animal Science, Dr Aila Vanhatalo, FIN-00014 University of Helsinki, www.animal.helsinki.fi/english/index.html

[9] Helsinki University, Faculty of Veterinary medicine, Kristiina Dredge, Saari unit, Pohjoinen pikatie 800, FIN-04920 Saarentaus, http://www.vetmed.helsinki.fi/saari/english/index.htm

Department of Food and Environmental Hygiene, University of Helsinki (HU/DFEH) and Department of Risk Assessment at the National Veterinary and Food Research Institute (EELA/DRA)

There are two institutes in Finland doing research on food safety and pathogens: The Department of Food and Environmental Hygiene, University of Helsinki (HU/DFEH) [10] and the Department of Risk Assessment at the National Veterinary and Food Research Institute (EELA/DRA)[11]. HU/DFEH has special expertise in molecular biological detection and characterization methods and in understanding the epidemiology and contamination routes of psychrotrophic food-borne pathogens. EELA/DRA has special expertise in modelling of food production chain from farm to table and scientific risk assessment.

2.1.3 University of Joensuu

The Karelian Institute

The Karelian Institute is a research unit of the University of Joensuu[12]. The Institute consists of three departments: Ecology, Humanities and Social Sciences. Research on organic production has been carried out in the Department of Social Sciences. The focus has been in empirical studies on organic farmers' motivation and decision-making, and the process of rapid expansion of organic production (institutionalisation, professionalisation, conventionalisation). Presently, the social meanings and development of organic production as a part of the greening food system and the actor networks around this process are studied. Organic production is seen as a tool for rural policy.

2.1.4 National Consumer Research Centre

The food studies at the National Consumer Research Centre[13] produce information on the views and expectations of consumers concerning food, food production and the food chain. The objective is to enhance the understanding of consumers' practices related to food purchasing, food preparation, eating and food economy in general. In addition, the studies focus on the views and interpretations of consumers concerning food safety as well as liability, quality and reliability of the actors in the food chain. The approach of the research group is multidisciplinary and consumer-oriented. In the case of organic food, the focus is on consumers' understandings and conceptualisations of organic food.

2.1.5 VTT Technical Research Centre of Finland

VTT Technical Research Centre of Finland[14] is a contract research organisation involved in numerous international assignments. VTT provides a wide range of technology and applied research services for its clients. The core technological competences of the 'Food Biotechnology' - knowledge centre at VTT are food structure engineering, processing technologies for healthier

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[10] Helsinki University, Faculty of Veterinary medicine, Department of Food and Environmental Hygiene, hannu.korkeala@helsinki.fi, riitta.maijala@helsinki.fi, Agnes Sjöbergin katu 2, FIN - 00014 University of of Helsinki http://www.vetmed.helsinki.fi/english/research_food.htm

[11] The National Veterinary and Food Research Institute of Finland EELA, Department of Risk Assessment, Dr. Vesa Myllys, Mustialankatu 3, FIN-00790 Helsinki, www.eela.fi/en/index.html

[12] University of Joensuu, Karelian Institute, Department of Social Sciences, Dr. Eeva Kuusela, P.O.Box 111, FIN - 80101 Joensuu, http://www.joensuu.fi/ktl/index.php?profiili=24

[13] National Consumer Research Centre, Dr. Johanna Mäkelä, P.O.Box 5, FIN - 00531 Helsinki, http://www.kuluttajatutkimuskeskus.fi/?l=en

[14] VTT Technical Research Centre of Finland, Biotechnology, Anne Arvola, P.O.Box 1000, FIN - 02044 VTT, Finland, http://www.vtt.fi/services/cluster4/index.jsp

products, beneficial microbes in foods and food processes, as well as consumer science and food choices. The most important customer segment is the food industry. Research and development is carried out in joint interdisciplinary projects with industry and universities or in confidential contract work with industrial customers. Organic food related research at VTT is part of wider interest in understanding factors and mechanisms behind consumers' food choices. These factors include consumer beliefs, attitudes and perceived sensory quality.

2.1.6 Work Efficiency Institute (TTS Institute)

The Agricultural Department of the TTS Institute[15] concentrates on applied technological research and development of rural industries. The main focus is to combine human labour and technology in rural production in an economically and ecologically sustainable way. While specialising in the organisation of farm work and the development of working methods, economically efficient and ecologically sustainable production, as well as energy saving and occupational safety are also promoted. The studies are carried out in cooperation with domestic or foreign research institutes, related industry, organisations and the business community.

2.1.7 Financing

Most of the funding for organic farming research has been supported by the Finnish Ministry of Agriculture and Forestry either through the budgets of its research institutes (mainly MTT Agrifood Research Finland) or through financing research projects from its non-committed research budget. The Academy of Finland and Tekes - the National Technology Agency - have also supported research on organic farming, but only in a small number of projects. In recent years, the cooperation between these major players has developed in terms of joint programmes and consultations in the project selection phase.

2.1.8 Coordination and planning of the research

In 2001, Finnish researchers in the field of organic farming set up a network, the Finnish Research Network on Organic Agri-Food Systems (ReNOAF)[16]. The aim is to promote the interaction between researchers, establish the research topics for research programmes in Finland and to have joint research projects. The work is voluntary and there is no separate financing for it. The communication in ReNOAF operates via an e-mail list and meetings of theme groups (society and environment, products and markets, plant production, animal production, soil science).

In other respects, the organisation and coordination of organic agri-food research is embedded in the regular planning process of the research organisations involved.

Along with this new Research Programme, the ReNOAF is an organ coordinating and developing the national organic agri-food research of high quality. One important aim is to have extensive communication between research and interest groups. This takes place via research seminars, workshops, research education and a research project database. In the network, there is close interaction between organic and conventional agri-food research, which benefits the whole research field. This is an example to be extended to the whole field of Finnish agri-food research as well as international research.

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[15] TTS Institute, anna-maija.kirkkari@tts.fi, P.O.Box 28, FIN-00211 Helsinki, Finland, www.tts.fi/uk/index.html;

[16] Finnish Research Network on Organic Agri-Food Systems (ReNOAF), c/o MTT Agrifood Research Finland, Ecological Production, Arja Nykänen, FIN-51900 Juva, http://www.agronet.fi/luotu/eng/contact.htm

2.1.9 Main stakeholder organisations

The most important stakeholder organisations[17] in Organic Food and Farming are: Luomuliitto – Finnish Association for Organic Farming, Pro Agria - Rural Advisory Centre (national and local ones), the Plant Production Inspection Centre (KTTK, supervises organic agricultural production), Finnish Consumer Association, Finnish Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of the Interior, Ministry of Trade and Industry, Finnish Environment Institute, Regional Environment Centres, companies operating in the whole food chain, regional food chain actors and municipal officials.

3 Research programmes

The first research programme on Organic Food and Farming in Finland was launched in 1991. This programme was called 'Research Programme on Organic Production of the Agricultural Research Centre of Finland 1992-1995' (updated for 1995-1997). Research topics were prioritised by a questionnaire sent to actors in the food chain. The most important topics concerned plant production (composting, biological nitrogen fixation and soil), animal husbandry (feeding as well as behaviour of animals and production environments). Economic research was involved in all studies. Financing came from the MTT's own budget. The second programme was called 'Research Programme on Organic Food and Farming 1998-2002' and it also included a 'Research Programme on Agricultural Engineering in Organic Farming'. This programme was a result of expert group discussions. Research topics of this programme were aimed to cover the entire food chain. There was no special financing for this programme.

At the moment, there is a research programme funded by the Finnish Ministry of Agriculture and Forestry 2003-2006. In 2001, the Ministry appointed a specific working group to prepare a proposal for a comprehensive Research Programme for Organic Food and Farming. As a result, a three-year-programme in this field was launched in October 2002. The programme consists of 15 projects on different themes covering the whole food chain (Table 1). Projects are organised under the following priority areas for research: quality and risks of organic food, consumer oriented product development, maintenance of soil fertility, safe recycling of organic waste, improved production of seeds, improved production of organic milk and meat, animal welfare and organic farming, local food systems, and role of organic farming in multifunctional and pluriactive agriculture.

[17] For the addresses of these stakeholder organisations please check the address database of www.organic-europe.net

Table 1: Projects under the programme of Ministry of Agriculture and Forestry (MMM-FI) 2003-2005)

No	Project name
1	Red clover efficiently into organically produced milk
2	Quality beef with efficient suckler cow production
3	Organic egg production: management of animal welfare and food safety
4	Emerging food-borne pathogens (EHEC) in primary production
5	Risk assessment on food safety risks in organic pork production: pathogenic *Yersinia* and *Listeria* monocytogenes
6	Development of meat-bone meal as organic fertilizer
7	Waste composts in organic crop production – Future risks and possibilities
8	On-farm soil quality assessment
9	Control of potato late blight by caraway oil in organic farming
10	Disease management in organic seed potato production
11	Specialisation of organic farms through cooperation
12	Local food system: impacts and learning challenges
13	Consumers, decision makers and local or organic food. Possibilities of SMEs
14	Frontiers of organic and conventional farming technologies – Environmental efficiency, productivity and learning
15	Interaction between actors of organic demand-supply chain

Table 2. The financial expenditure on the Organic Food and Farming Research Programme of the Ministry of Agriculture and Forestry (MMM-FI) per research topic (Euro)

	Projects	2003	2004	2005
Farming systems	2,11	164 370	368 630	222 500
Animal husbandry	1,2,3	396 350	814 990	616 500
Crop production	1,6,9,10	320 600	372 960	287 000
Soil	1,7,8,	155 300	264 960	236 300
Environmental aspects	14	70 000	111 000	70 000
Food systems	3,4,5,12,15	386 080	671 160	598 000
Values, standards, certification	13	121 500	204 200	198 000
Information management				
Total		**1 614 200**	**2 807 900**	**2 228 300**

4 Financing

The first two research programmes on Organic Food and Farming were financed by different financing bodies and the projects competed for money with research projects concerning conventional farming. The main financer for agricultural research in Finland has been the Ministry of Agriculture and Forestry. The Academy of Finland, Ministry of Environment and Tekes - the National Technology Agency - have also supported research on organic farming, but only in a small number of projects.

At the same time with the Organic Food and Farming Research Programme of the Ministry of Agriculture and Forestry (MMM-FI), there are some other projects under way as well. The total annual

expenditure on Organic Food and Farming research in Finland according to research topic is presented in table 3.

Table 3. Annual budgets (in Euro) of Organic Food and Farming research in Finland from 2000 onward, according to research topics

	2000	2001	2002	2003	2004	2005
Farming systems	393 907	240 481	327 679	351 408	469 909	222 500
Animal husbandry	198 142	373 213	254 809	545 927	919 757	616 500
Crop production	843 112	1 340 428	1 749 921	1 647 173	1 118 520	342 000
Soil	81 328	125 125	0	155 300	264 964	236 300
Environmental aspects	102 459	383 515	431 614	440 254	362 266	70 000
Food systems	117 670	168 657	228 104	538 422	915 933	598 000
Values, standards, certification	0	0	0	180 242	205 533	368 000
Information management	0	0	0	0	0	0
	1 736 618	**2 631 419**	**2 992 127**	**3 858 726**	**4 256 881**	**2 453 300**

Most of the Organic Food and Farming research in Finland, about 70-95 %, is carried out at the MTT Agrifood Research Finland. The rest is done at the universities (mainly the University of Helsinki) and other institutes. The distribution of funds used in Organic Food and Farming research according to the institutes in different years is presented in figure 1.

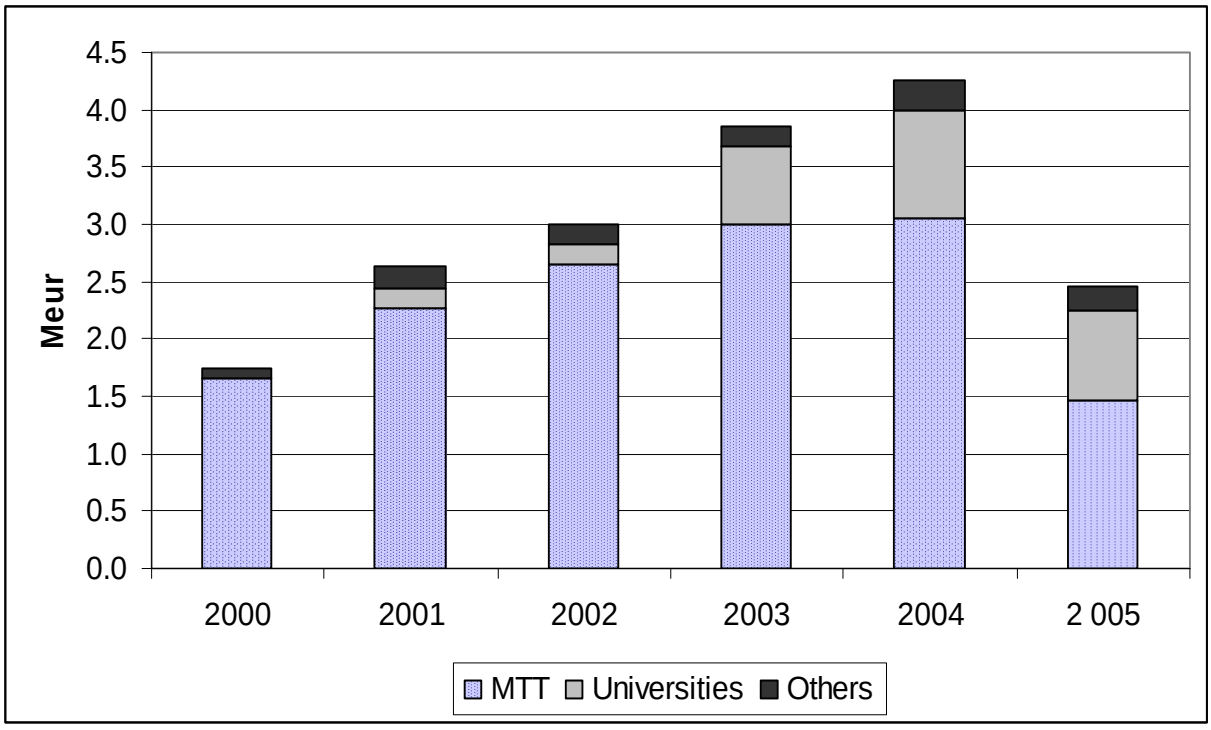

Figure 1. The amount of Organic Food and Farming research funds (million EUR) in Finland from 2000 according to institutes

The maintenance and financing of research facilities takes place through the institutes' own budget money. The actual research activities with the related facilities are financed through research projects, which are mainly financed by external money.

5 Research facilities

In Finland, the main research facilities for research in Organic Food and Farming concern organic plant production – research fields and leaching fields with different crop rotations and farming practices. One cattle building is used for organic animal production research. One mass spectrometer is available for ^{15}N-measurements. Fistulated cows can be used for research on organic production as well.

Partala experimental farm

The fields of Partala experimental farm[18] with an area of 28 hectares (owned by the MTT Agrifood Research Finland) have been under organic farming since 1985. Nowadays they are under crop rotation of organic dairy farming consisting of 2-year-old clover based leys, pulse crops and vetch based green fodder. The soil type is moraine soil and the nutrient status is quite diverse. The farm is situated in Eastern Finland (62° N 27° E). The annual rainfall is about 650 mm, average temperature 3.5°C, growing season 190 days and effective temperature sum 1250°C. There is also a two hectare spatial field, where lots of chemical, physical and biological parameters, as well as quality and quantity of clover based ley have been determined on 105 plots to determine the variability of these parameters spatially. Nutrient leaching data have also been collected from certain plots.

Karila experimental station

The fields of Karila experimental station[19] (owned by the MTT Agrifood Research Finland) have been partly under organic farming since 1995 (four hectares) and partly since 2001 (5.5 hectares). Nowadays they are under crop rotation of organic dairy farming consisting of 2-year-old clover based leys, pulse crops and vetch based green fodder. Soil type is fine sand. The station is situated in eastern Finland (61° N 27° E). The annual rainfall is about 650 mm, average temperature 3.1°C (growing season 12.6°C), growing season about 160 days and effective temperature sum 1200°C.

Stockless organic farm, Kourla

The Organic Research Farm Kourla[20] (owned by the MTT Agrifood Research Finland) is situated in southern Finland (60° N 24° E). The fields of 20 hectares have been under organic farming since 1994. The main soil type is clay soil and crop rotation consists of clover based leys, vetches, cereals and oil seed hemp. The farm is further developed as a model for stockless organic farming. Planning and book keeping is launched using different programmes. Records of soil fertility are regularly made. The plots are offered to other units for experiments. Detailed research projects are planned yearly.

Muuruvesi College and Organic Farm

Muuruvesi Organic Farm (owned by the Savo Vocational College) is situated in Eastern Finland (63° N 28° E). The fields of Muuruvesi farm have been under organic farming partly since 1988 and the whole farm since 1995. The arable area is 145 hectares and the soil type is mainly silt, containing 3-6% organic matter. The crop rotation consists of silage, pasture, hay, oats, barley and peas. The farm has had organic milk production since 1998. There are 60 cows and average milk yield is 9500 kg/year. A new cowshed was built in 2001 and now it is possible to make feeding experiments with cows in 2-3 groups.

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[18] http://orgprints.org/5566/

[19] http://orgprints.org/5576/

[20] http://orgprints.org/5637/

There is also 3000 m^2 of greenhouse are in the organic production of tomatoes and cucumber and some pepper, honeydew melon and aubergine.

Toholampi leaching field

Toholampi leaching field (owned by the MTT Agrifood Research Finland) is situated in Western Finland (63° N 24° E). The field consists of 16 plots of 0.16 hectares each. The soil type is fine sand, with five % organic C in the plough layer. There has been an experimental setup with organic and conventional crop rotations since 1997. Plots are sub-drained and water is collected separately from each plot to the observation building, where the volume of water is measured and flow-weighted water samples for analyses are taken manually. Surface water is also collected and measured.

Yöni leaching field

Yöni leaching field (owned by the MTT Agrifood Research Finland) is situated in south-western Finland (60° N 23° E). The soil type of the field is clay, with four percent of organic C in the plough layer. There are six plots, 0.5 hectares each. Two plots have been under organic farming since 1993, two plots are under conventional farming and two plots are under natural grassland. The volume of the water from drainage pipes of each plot is measured automatically and flow-weighted water samples are taken by hand. Surface runoff is conducted to the same measurement system so that the runoff represents the total runoff from the plots. There are four other plots under organic and four plots under conventional farming, but the drainage system does not allow the measurement of runoff from these plots.

6 Initiation of research and stakeholder engagement

The main funding body for agricultural research in Finland, the Ministry of Agriculture and Forestry (MMM-FI), follows a long-term planning process, which produces information about the information needs of the Ministry. MMM-FI has set up a consultative body -the Advisory Board for Agri-Food Research- which consists of 12 experts representing different stakeholder groups (rural extension, policy, industries, research...) to find out the information needs of the society. The Advisory Board presents initiatives to the Ministry as regards to relevant research themes and fields. As a result, MMM-FI makes an open invitation in June for new research projects and, after an evaluation procedure, the decisions are made in March of the following year.

In Finland, new research programmes or priority lists of topics on Organic Food and Farming are initiated mainly via the Finnish Research Network on Organic Agri-Food Systems (ReNOAF). The network consists of researchers and other stakeholders who are interested in Organic Food and Farming research. Different methods have been used to define the research priorities. The most common ones have been meetings and discussions within the network and by hearing other stakeholders. Some enquiries as well as e-mail discussions have also been used. Financers have been invited to discussions to get them involved in the financing of Organic Food and Farming research.

In Finland, no special evaluation of research methodologies used in Organic Food and Farming research has been applied.

7 Selection criteria and evaluation procedures

The main funding body for agricultural research in Finland is the Ministry of Agriculture and Forestry (MMM-FI), the evaluation criteria of this are described below.

Projects funded by MMM-FI are evaluated on the basis of the following criteria:

- Scientific excellence, innovativeness (projects must be of high scientific quality and demonstrate innovative hypothesis, methodology or technology)
- Partnership and resources (projects must demonstrate efficient value-added, cooperation of researchers and the partners and institutes must be able to carry out the project)
- Relevance (projects must fall within the pre-set areas of research, they must produce know-how and/or technology solving a relevant need either in policy preparation or in the development of agriculture)

Each proposal is evaluated by at least three experts. Formerly, the experts were selected amongst the members of the Advisory Board and MMM-FI staff, but in recent years, the number of external experts has been increasing. International evaluation is under consideration and has been piloted in the ongoing research programme of Organic Food and Farming.

The Advisory Board prepares a proposal for a short-list of projects to be funded, to the Ministry. The short list is balanced between different programmes and programme areas. Very often, the number of excellent projects is far beyond the available funding and cuts to the budgets must be made. The Ministry makes the final funding decision, but usually it follows the recommendation of the Board quite closely.

The follow-up of ongoing projects is based on the work of steering groups. These groups are nominated from representatives of interest groups, users of results, and co-financers of the project. The steering group meets the researchers twice a year and it has to give a positive assessment each year to keep the project going. Self-evaluation of the research project has to be included in the final report. Funding is usually based on ex-post payments made once or twice a year.

In Finland, there are no special evaluation criteria for Organic Food and Farming research. The evaluation is based on the normal evaluation procedure, including the balancing of different topics defined in the research programmes.

8 Utilisation of research

Farmers can utilize the research results through advisory bodies, research seminars and articles published in professional journals. On-farm research and participatory research are one way to disseminate research results. Advisory services utilise research through seminars and direct contacts with researchers. Other stakeholders utilise the research via direct contacts with researchers. Research priorities are discussed and formulated together with all stakeholders.

9 Scientific education and research schools

Extensive teaching in Organic Food and Farming is available at the University of Helsinki, while the University of Joensuu offers some individual courses about the topic. Besides study modules in Organic Food and Farming, the University of Helsinki offers degree programmes (BSc, MSc) in Agroecology, which is closely related to Organic Food and Farming. Other Finnish universities offer studies, which may support studies in Organic Food and Farming, mainly courses in environmental

issues and sustainable development. Some postgraduate studies for PhD students are also being planned.

The University of Helsinki offers courses for basic studies (25 credits) and intermediate studies (35 credits) in Organic Food and Farming. Advanced studies are also being planned. The studies are organised by the University of Helsinki, Ruralia Institute in Mikkeli. The studies meet the study requirements of the Faculty of Agriculture and Forestry, where the responsible department is the Department of Applied Biology.

The education offers qualifications for critical examination and sustainable development of Organic Food and Farming and prepares students to work specifically in jobs related to the organic food chain. Basic studies give a general view to organic production and underlying principles, while intermediate studies deepen the understanding of current issues in organic production.

In the academic year 2005 – 2006, there are altogether 17 courses, which discuss sustainable development and principles of Organic Food and Farming, primary production (production systems, plants, animals), food production (food, food chains, manufacture, social and economic issues), quality, food systems and case studies. Within these courses, students also have the opportunity to take basic and intermediate literature exams, do practical training, for example, in a research group and carry out projects of their own.

These multidisciplinary studies are meant for all university students regardless of the subject in which they are majoring. Half of the studies (mainly intermediate studies) are also offered for foreign students in English.

Teaching is closely connected to the ongoing research on Organic Food and Farming at the University of Helsinki Ruralia Institute and elsewhere. Teaching applies progressive inquiry and communal learning. Intensive teaching periods, expert lectures, group work, visits to farms and enterprises, e-learning and independent study periods are essential parts of the courses. Several courses are run completely on the Internet.

Teaching and planning staff cooperates with the European Network EONAT [21] and the Nordic network AGROASIS (Nordic School of Agroecology/Ecological agriculture) [22] in order to develop the studies and promote student and teacher exchange.

[21] European Network of Organic Agriculture Teachers[0] ENOAT, www.umb.no/?viewID=7187)

[22] Bachelor of Science degree, Specialisation in Ecological Agriculture, Ruralia Institute, FiN-50100 Mikkeli, http://www.mtkk.helsinki.fi/ecostudies/english_studies.htm or –courses (BSc) in the European Common this is not the same as the agroasis, it is a specialised degree in OF, should this not be mentioned in the text ?It does not say to be the same as AGROASIS, but they cooperate with AGROASIS. I hope it can remain as it is.

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CORE Organic Country Report

The National Research Programmes on Organic Farming 2000–2006: French Country Report

Ministère de l'Agriculture et de la Pêche / the Ministry of Agriculture and Fisheries, Teaching and Research Department (DGER)

Institut National de la Recherche Agronomique / National Institute for Agricultural Research (INRA)

Association des Centre Techniques Agricoles / Union of the Technical Institutes for Agriculture (ACTA)

Institut Technique de l'Agriculture Biologique / Technical Institute of Organic Agriculture (ITAB)

Association des Centres Techniques des Industries Alimentaires / Union of the Technical Institutes for Food Processing (ACTIA)

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Photo: CREAP MP (Organic Farming Experimentation and Research Centre specialized in arable crops)

March, 2006

Contents

1 Introduction

In France, the research programmes have always been fairly decentralized. They are being carried out at several research institutions[1] and universities. Government funding and sources of financing are available at national, regional and district level. Even at the national level, it is not easy to identify a real unified research policy. The main way to analyse the funding systems is to follow up the topics mentioned in the calls for proposals, which are often very much influenced by various policy networks.

During the last decades, farmers' organisations have influenced the main themes of the research programmes, both at the National Institute for Agricultural Research (INRA) as well as at other institutions. However, since the beginning of the 1990s, a real diversification of the themes can be observed, due to substantial changes that have been taking place in the agricultural sector since then. Changes include the diversification of production models towards designation of origin (DOC); introduction of farmhouse products, extensive agriculture, breeding with suckling cows; increased attention on rural development, environmental aspects, sustainability, etc. Organic farming has a special place in this framework as its policy networks had to fight a long time to become recognised.

In the year 2000 a national programme for organic farming was set up by the Ministry of Agriculture and Fisheries and the National Institute for Agricultural Research (INRA). At the same time there were also other calls for proposals from various bodies, both at national and regional level, which cover organic farming within the overall topics. Several of these programmes are described in this article, even if they are not specialised on organic farming. It should be mentioned in this context that the main responsible experts are represented in the different boards. Organic farming projects are therefore consistent and overlapping is in fact often avoided.

The main actors in French agricultural research are

- National Institute for Agricultural Research (INRA),
- the Ministry of Agriculture and Fisheries (Teaching and Research Department DGER) and the Ministry of Research,
- the Union of the Technical Institutes for Agriculture (ACTA), consisting of 20 technical institutes organised by agricultural commodities,
- the Union of the Technical Institutes for Food Processing (ACTIA), consisting of 15 technical institutes organised by processed commodities,
- the Agency for Agricultural Development (ANDA) which was replaced in 2004 by the Agency for Agricultural and Rural Development (ADAR) who are yearly issuing calls for proposals.

The whole system was simplified and rationalised in 2005 by the creation of the National Research Agency.

[1] Among the most important are the National Institute for Agricultural Research (INRA); the National Centre for Scientific Research (CNRS), the Centre of Research for Agricultural Engineering (CEMAGREF) and the Institute for medical research (INSERM).

2 History of Organic Farming Research in France

During the last decades, agricultural institutions and trade organisations had long viewed organic farming as a marginal activity. Thus, institutions only started in the 1980s and 1990s to carry out specific activities around research in organic farming. The Technical Institute of Organic Farming (ITAB) for example was created in 1983 by the organic movement and started trial activities in the 1990s.

The National Institute for Agricultural Research (INRA) has been quite reluctant for a long time to commit itself to a research programme. However, the recent political recognition of organic farming has prompted various organisations to draw up official policies to promote it. In France, this shift can be dated December 1997, when a medium-term plan for the development of organic farming was introduced. INRA announced its commitment to a research programme in January 2000, while emphasizing the need to comply with the rules governing all research activity. The Union of the Technical Institutes for Agriculture (ACTA) which is in charge of applied research in agriculture, encouraged its members, the 18 product oriented institutes, to devote some means to research and trials in the area of organic farming. In 2000, the Directorate for Teaching and Research (DGER) within the Ministry of Agriculture and Fisheries was asked to set up a specific committee in charge of coordinating the activities of ITAB, INRA and ACTA.

3 Organisation of the Research Programmes

As mentioned above, various funding bodies are concerned with organic farming.

Table 1: The main agricultural research programmes specialized on or related to organic farming

	2000 – 2003	**2004 – 2007**
Ministry of Agriculture and Fisheries	INRA-ACTA[2:] Organic Farming programme Agribio I	INRA-ACTA-ACTIA[3]: Organic Farming programm Agribio II
	INRA research on regional development (INRA PDSR)	
		ADAR[4] call for proposals
Ministry of Research	AQS[5]	RARE[6]
Regional funding	Contrats de Plan Etat – Régions: Regionally funded research; organic farming projects/programmes in Brittany, the South East and South West of France and the Massif Central.	

[2] ACTA: Union of the Technical Institutes for Agriculture

[3] ACTIA: Union of the Technical Institutes for Food Processing, http://www.actia.asso.fr

[4] Agence pour le Développement Agricole et Rural / National Agency for Agricultural and Rural Development (ADAR), http://www.adar.gouv.fr/

[5] AQS: Aliment Qualité Sécurité (Food, Quality and Safety), replaced in 2003 by RARE

6 RARE: Réseau Agro-alimentaire Recherche Europe (Network Agri-Food Research Europe)

The main programmes devoted to research on organic farming are the "INRA Organic Farming" Programmes Agribio I and Agribio II, managed by the Ministry of Agriculture and Fisheries with the participation of the National Institute for Agricultural Research (INRA), the TechnicaI Institute of Organic Agriculture (ITAB), the Union of the Technical Institutes for Agriculture (ACTA) and the Union of the Technical Institutes for Food Processing (ACTIA). The overall organisation appears in the following chart.

Important note

It is very important to remember that project funding for research institutes and universities never includes public salaries. In this case, the funding mentioned here concerns only additional costs (sometimes including researchers receiving salaries on fixed term contracts). On the other hand, technical institutes are funded for the additional costs of the project, supplemented with 50 % of their public salaries and 100 % for researchers receiving salaries on fixed term contracts. Private institutes are entirely funded for all salaries and additional costs. "Additional funding" therefore refers to the money which is actually paid to the institution. In order to assess the global costs (including salaries and social security contribution) of any project, the following average rates will be implemented (see table below).

Table 2: Rates to estimate the total research costs

Types of research institutions	Rate
INRA, CEMAGREF[7], INSERM[8], CNRS[9], Universities	Additional funding * 4
Technical institutes (ITAB and other institutes)	Additional funding * 2
Private agencies	Additional funding * 1

[7] Institut de recherche pour l'ingénierie de l'agriculture et de l'environnement / Agricultural and environmental engineering research (CEMAGREF), F- F 92163 Antony, http://www.cemagref.fr

[8] Institut national de la santé et de la recherche médicale / National Institute of Health and Medicinal Research (INSERM), F- 75654 Paris, http://www.inserm.fr/

[9] National Centre for Scientific Research (CNRS)

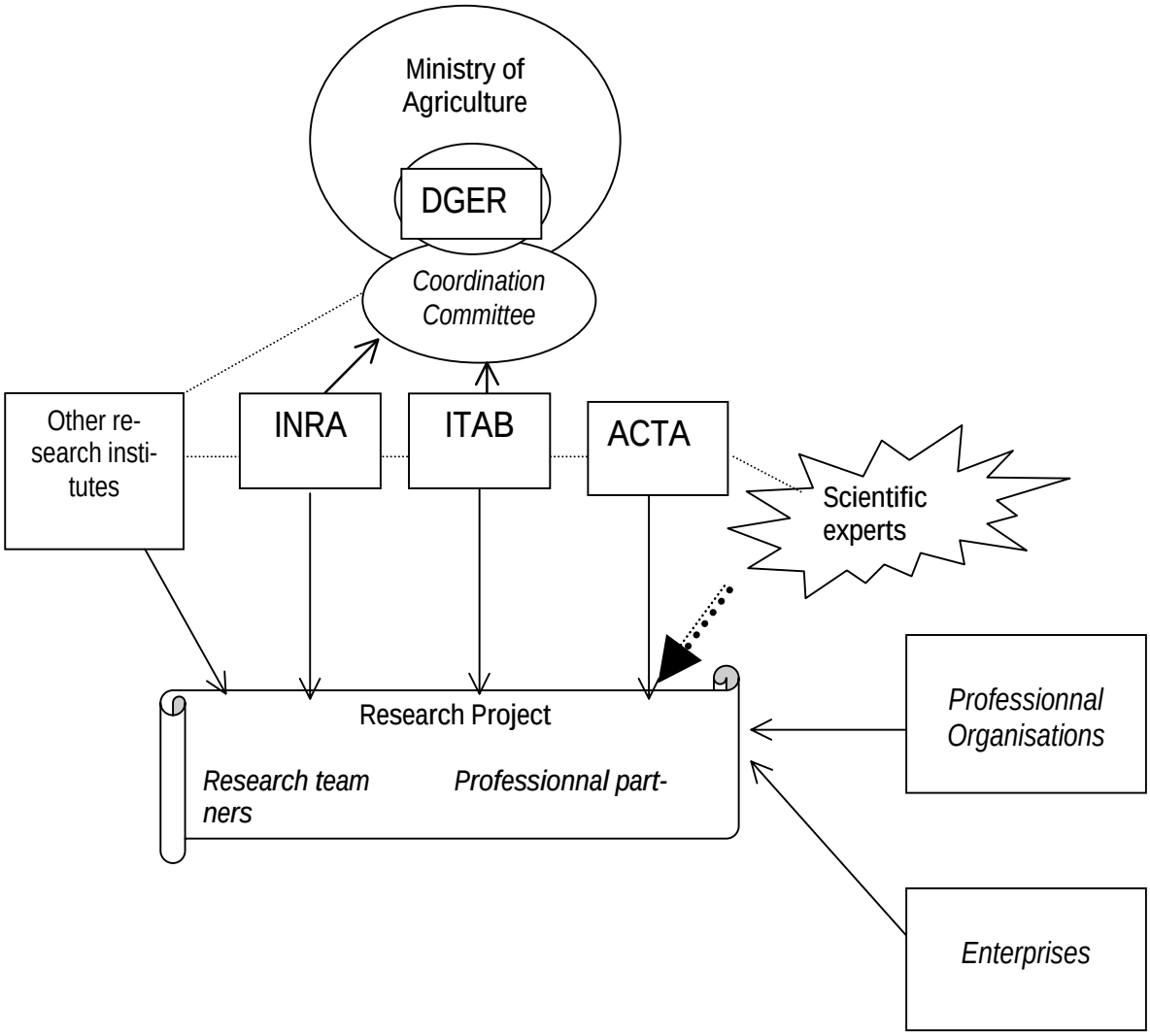

Figure 1: Organisation of the research programme on organic farming

4 Mapping Research Programmes

The National Institute for Agricultural Research (INRA) pursues an all-round approach combining cross-disciplinary and partnership-based research. It views organic farming as a model for sustainable agriculture. This starting point allows for analytical research while also reinforcing the systemic approach. It leads to an understanding of the processes involved in farming to meet strict production standards and should, in the long term, yield innovative solutions. A further challenge is to understand the societal needs related to organic farming and to analyze and rank them by importance, be it in terms of production, processing, or control of the outputs of organic farming (product quality, ecological balance, environmental impact, macro-economic optimization, etc.).

The task of the INRA's Internal Committee on Organic Farming (CIAB)[10] is to develop a research programme (through the organisation of an in-house invitation-to-tender under the applicable regulations) with the objectives:

1) *to better understand organic farming* (through the compilation of a database of scientific reference works with links to other databases),

2) to hold scientific seminars in order *to transfer and discuss the research results. CIAB organises* conferences on specific topics in association with organic farming organisations and with the participation of INRA and non-INRA scientists and practitioners[11]), and

3) to develop a research programme.

These objectives have to be achieved on three scientific fields (see table 3, which shows both the objectives and scientific fields). The aim of the research programme is to identify motivated in-house teams and to build a network that is both consistent and reliable in terms of sharing information, defining objectives and methods, providing research incentives, and evaluating and transferring results.

Table 3: The research programme objectives

	Objectives		
Fields of research	To better understand organic farming	To transfer and discuss scientific results	To develop new projects
Production	Production rules	Extension	Explanation
Production systems	How to combine objectives	Methodology and tools	Conversion of new systems to organic farming
Economics	Statistics	Supply chains Demand	Organic Marketing Initiatives

The basic principles of partnership-based research require that programmes are developed in conjunction with practitioners. Thus, the Teaching and Research Department (DGER) of the Ministry of Agriculture and Fisheries set up a co-ordination platform with the National Institute for Agricultural Research (INRA), the Union of the Technical Institutes for Agriculture (ACTA) and the Technical Institute of Organic Agriculture (ITAB)[12]. This Platform group is to support DGER in coordinating programmes on research, development, and education.

4.1 National Programme 2000 - 2003

4.1.1 Programme "Agribio I" (INRA and ACTA)

Agribio I was a joint programme of the National Institute for Agricultural Research (INRA) and the Union of the Technical Institutes for Agriculture (ACTA). The total national costs were approximately € 34 million. All projects carried out under this programme are listed in annex 1. The breakdown according to subject areas is as follows:

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[10] Comité Interne pour l'Agriculture Biologique / Internal Committee for Organic Agriculture at INRA (CIAB), F- 31 326 Castanet Tolosan, http://www.inra.fr/ciab

[11] The subjects covered in 2000-2002 dealt with crop protection and organic farming, genetic resources and organic farming, animal health and organic farming, assessment of techniques used in breeding.

12 Institut Technique de l'Agriculture Biologique / Technical Institute of Organic Agriculture (ITAB), F- 75595 Paris, http://www.itab.asso.fr/

Table 4: Agribio I – Budget according to subject areas (2000-2003)

Subject Areas	Projects[13]	National Targeted funding amount (in € 1,000)	National total costs (in € 1,000)
1 - Farming systems	AB-1-10	5	568
2 - Animal husbandry	AB1-3, AB1-15,	244	1,641
3 - Crop husbandry	AB1-1, AB1-2, AB1-5, AB1-6, AB1-9, AB1-11, AB1-13, AB1-14, AB1-16, AB1-17, AB1-18, AB1-19	586	30,952
4 – Soil			
5 - Environmental aspects	AB1-7, AB1-12	17	452
6 - Food systems	AB1-8	8	188
7 – Value, standards and certification	AB1-4	11	71
8 – Knowledge management			
Total			34,000

This programme involved approximately 166 research engineers and scientists corresponding to approximately 1,432.9 person months. The researchers belong to 13 different institutes.

- Involved research institutes and school of higher education: CEMAGREF[14], CIRAD[15], ENITA[16], INAPG[17], INRA[18], ISARA[19]
- Involved technical institutes: CETIOM[20], CTIFL[21], ITAB[22], ITV[23]
- Involved development bodies: CIVAM BIO[24], GIS-GEPAB[25], GRAB[26]

13 For project list see annex 1.

14 Institut de recherche pour l'ingénierie de l'agriculture et de l'environnement / Agricultural and environmental engineering research (CEMAGREF), F- F 92163 Antony, http://www.cemagref.fr

15 La recherche agronomique au service des pays du Sud / French Agricultural Research Centre for International Development (CIRAD), F-75116 Paris, http://www.cirad.fr

16 Ecole nationale d'ingénieurs des travaux agricoles (ENITA)) Site de Marmilhat - BP 35 - 63370 Lempdes http://www.enitac.fr/

17 Institut national agronomique Paris-Grignon (INAPG), FR- 75231 Paris, http://www.inapg.fr

18 Institute National de Recherche Agronomique / National Institute for Agricultural Research (INRA), F- 75338 Paris, http://www.inra.fr/

19 Institut supérieur d'agriculture (ISARA), F- 69288 Lyon, http://www.isara.fr

20 Centre Technique Interprofessionnel des Oléagineux Métropolitains / The Technical Center for Oilseed Crops (CETIOM), F- 78850 Thiverval-Grignon, http://www.cetiom.fr/

21 Centre Technique Interprofessionnel des Fruits et Légumes, F- 75009 Paris, www.ctifl.fr

22 Institut Technique de l'Agriculture Biologique (ITAB), F- 75595 Paris, http://www.itab.asso.fr/

23 Centre Technique Interprofessionnelde la Vigne et du Vin (ITV France), F-Paris, http://www.itvfrance.com

24 Fédération Nationale des Centres d'Initiatives pour Valoriser l'Agriculture et le Milieu rural FNCIVAM

25 Groupe d'Etudes Pluridisciplinaires en AB GIS GEPAB

26 Groupe de Recherche en Agriculture Biologique / Research Group on Organic Agriculture (GRAB), F- 84 911 Avignon, http://grab.agriculturebio.org/

4.1.2 Programme "INRA – PSDR"(Research for and on Regional Development) not exclusively organic

The programme INRA - PDSR focused on regional development and is not exclusively devoted to organic farming. The total national costs were approximately € 1.9 million. A complete project list is available in Annex 1. The breakdown by subject areas is as follows:

Table 5: INRA-PSDR – Budget according to subject areas (2000-2004)

Areas	Projects[27]	National Targeted funding amount (in € 1,000)	National Total costs (in € 1,000)
6 Food systems	*1, 2*	*588*	*1,907*
Total			*1,907*

This program involves approximately twelve research scientists corresponding to approximately 176 person-months. The researchers belong to eight different institutes:

- Research institutes and schools of higher education: INRA, ENITIA[28], University of Nantes, Ecole supérieure d'agriculture d'Angers
- Development bodies: GRET[29], CAB pays de la Loire, InterBio Pays de la Loire, Regional Chamber of Agriculture

4.1.3 Programme "ACTA" (Without INRA contribution)

The total national costs of the programme of the Union of the Technical Institutes for Agriculture (ACTA), running 2000 to 2004, were approximately € 1.4 million. A full project list is available in Annex 1. The breakdown by subject areas is as follows:

Table 6: Budget according to subject areas (2000-2004)

Areas	Projects[30]	National Targeted funding amount (in € 1,000)	National total costs (in € 1,000)
2 Animal husbandry	ACTA-2	208	613
3 Crop husbandry	ACTA-1, ACTA-3, ACTA-4	175	767
Total			1 400

This programme involved approximately 143 research scientists corresponding to approximately 31 person-months.

27 For project list see annex.

28 Ecole nationale d'ingénieurs des travaux agricoles (ENITA) Site de Marmilhat - BP 35 - 63370 Lempdes, http://www.enitac.fr/

29 Groupe de recherche et d'échanges technologiques / Group for Research and Technology Exchange (GRET), F-75010 Paris, http://www.gret.org/

30 For project details please see annex 1.

4.1.4 Ministry of Research: "AQS program" (not totally devoted to organic farming)

The total costs of the Ministry's for the Research programme on Food, Quality and Safety (Aliment-Qualité-Sécurité AQS) amounted to approximately € 0.58 million. This programme was not exclusively devoted to organic agriculture. A complete project list is available in annex 2. The breakdown according to subject areas is available in the table below.

Table 7: Budget of the AQS programme 2000 – 2004 according to subject areas

Areas	Projects31	National targeted funding amount (in € 1,000)	National total costs (in € 1,000)
6 Food systems	AQS-1,AQS- 2	171	576
Total			576

These programmes involved approximately 54 scientists corresponding to approximately 54 person months. The researchers belong to nine different institutes:

- Research institutes and schools of higher education: INRA32
- Sector organisations: FNAB33, Biocoop34, Secodip35, Agence Bio36
- Development bodies: GRET37, CAB Pays de la Loire, InterBio Pays de la Loire, Chambre régionale d'agriculture

4.2 National Programme 2004 – 2007

4.2.1 Programme Agribio II

The organic farming programme Agribio II is carried out by the National Institute for Agricultural Research (INRA), the Union of the Technical Institutes for Agriculture (ACTA) and the Union of the Technical Institutes for Food Processing (ACTIA). The total national costs are approximately € 7.4 million. The projects are listed in Annex 1. The breakdown by subject areas is as follows:

[31] For project details please see annex 1.

32 Institute National de Recherche Agronomique / National Institute for Agricultural Research (INRA), F- 75338 Paris, http://www.inra.fr/

33 Fédération Nationale d'Agriculture Biologique / National Federation of Organic Farming (FNAB), F-75011 Paris, http://www.fnab.org/

34 Biocoop - Premier réseau des magazines bio en France / Network of Organic Shops in France, F-92220 Bagneux, http://www.biocoop.fr/

35 Secodip, TNS World Panel, F-Chambourcy, http://www.secodip.fr

36 Agence Bio / Agency for Organic Food and Farming, F-93100 Montreuil sous Bois, http://www.agencebio.fr

37 Groupe de recherche et d'échanges technologiques / Group for Research and Technology Exchange (GRET), F-75010 Paris, http://www.gret.org/

Table 8: Budget of the Programme Agribio II according to subject areas

Areas	Projects[38]	Targeted funding amount (in € 1,000)	National total costs (in € 1,000)
1 Farming systems	AB2-4	96	1,213
2 Animal husbandry	AB2-9	13	253
3 Crop husbandry	AB2-2, AB2-3, AB2-6, AB2-7	278	4,082
5 Environmental aspects	AB2-5	118	523
6 Food systems	AB2-1,AB2-8	232	1,365
Total			7,400

This programme involved approximately 141 research scientists corresponding to approximately 890.2 person-months. The researchers came from 28 different institutes.

- Research institute and schools of higher education: CIRAD[39], ENITA[40], ENITIAA[41], INRA[42], ISARA[43]
- Technical institutes ARVALIS[44], AERIAL[45], CTCPA[46], CTIFL[47], IE[48], ITAB[49]
- Development organisations: Chamber of Agriculture, CREAB[50], GRAB[51], IBB[52], GIS BIO Massif Central[53]

38 For project details please see annex 1.

39 La recherche agronomique au service des pays du Sud / French Agricultural Research Centre for International Development (CIRAD), F-75116 Paris, http://www.cirad.fr

40 Ecole nationale d'ingénieurs des travaux agricoles (ENITA) Site de Marmilhat - BP 35 - 63370 Lempdes http://www.enitac.fr/

41 Ecole nationale d'ingénieurs des techniques des Industries agricoles et alimentaires (ENITIAA) Rue de la géraudière, 44322 Nantes Cedex 3. http://www.enitiaa-nantes.fr/

42 Institute National de Recherche Agronomique / National Institute for Agricultural Research (INRA), F- 75338 Paris, http://www.inra.fr/

43 Institut supérieur d'agriculture (ISARA), F- 69288 Lyon, http://www.isara.fr

44 ARVALIS-Institut du végétal / Technical Institute for Cereals and Forage, F-75116 Paris, http://www.arvalisinstitutduvegetal.fr/fr/contact.asp

45 Technology Ressource Centrer (applied research programs on food irradiation) rue Laurent Fries - Parc d'Innovation, 67400 Illkirch –FRANCE http://www.aerial-crt.com/

46 Centre Technique de la Conservation des Produits Agricoles / Technical Centre for the preservation of agricultural products (CTCPA), F-75682 Paris, http://www.ctcpa.org/

47 Centre Technique Interprofessionnel des Fruits et Légumes, F- 75009 Paris, www.ctifl.fr

48 Institut de l'élevage (IE), 149 rue de Bercy, Paris, www.inst-elevage.asso.fr/

49 Institut Technique de l'Agriculture Biologique (ITAB), F- 75595 Paris, http://www.itab.asso.fr/

50 Centre Régional de Recherche et d'Experimentation en agriculture biologique, Route de Mirande 32 020 AUCH cedex 09 http://orgprints.org/6745/

51 Groupe de Recherche en Agriculture Biologique / Research Group on Organic Agriculture, (GRAB), F- 84 911 Avignon, http://grab.agriculturebio.org/

52 INTER BIO BRETAGNE (IBB) unites the organic sector in the region of Bretagne, http://www.interbiobretagne.asso.fr/,

53 Pôle scientifique Agriculture biologique Massif Central / Cooridnation of organic Farming research in the Massif Central (GIS BIO Massif Central) , F- 43 100 Fontannes, http://www.itab.asso.fr/PoleABMassifCentral.htm

4.2.2 Programme "ADAR"

The programme of the National Agency for Agricultural and Rural Development (ADAR) was carried out in 2005 (not exclusively organic). The total national costs are approximately € 1.9 million. The complete project list is available in annex 1. Please find the breakdown by subject areas below:

Table 9: Budget of the ADAR programme according to subject areas

Areas	Funding 2005	National Targeted funding amount (in € 1,000)	National total costs (in € 1,000)
3 Crop husbandry	ADAR-3	69	302
4 Soil	ADAR-2	298	883
6 Food systems	ADAR-1	249	736
Total			1,900

This programme involved approximately 15 research engineers and scientists corresponding to approximately 174 person-months. The researchers and engineers belong to 21 different institutes.

- -Research institute and schools of higher education: INRA[54], INSERM[55], ESA Angers[56], ISARA [57], University of Reims[58], CIHEAM-IAMM[59]
- Technical institutes: ARVALIS[60], CTIFL[61], GRAB[62], ITV[63]
- -Development bodies: Chambers of Agriculture, ITAB[64], CIVAM[65], CNRAB[66], GIS BIO Massif Central[67], ADABio[68], CREAB[69]

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[54] Institute National de Recherche Agronomique / National Institute for Agricultural Research (INRA), F- 75338 Paris, http://www.inra.fr/

[55] Institut national de la santé et de la recherche médicale / National Institute of Health and Medicinal Research (INSERM), F- 75654 Paris, http://www.inserm.fr/

[56] Ecole Supérieure d'Agriculture d'**Angers** / Agricultural University College Angers (Groupe ESA), F-49007 Angers, http://www.groupe-esa.com/

[57] Institut supérieur d'agriculture (ISARA), F- 69288 Lyon, http://www.isara.fr

[58] Université de **Reims** Champagne-Ardenne / University of Reims, http://www.univ-reims.fr/

[59] Institut Agronomique Méditerranéen de Montpellier / Mediterranean Agricultural Institute of Montpellier (CIHEAM - IAMM), F-34093 Montepellier, http://www.iamm.fr/

[60] ARVALIS-Institut du végétal / Technical Institute for Cereals and Forage, F-75116 Paris, http://www.arvalisinstitutduvegetal.fr/fr/contact.asp

[61] Centre Technique Interprofessionnel des Fruits et Légumes, F- 75009 Paris, www.ctifl.fr

[62] Groupe de Recherche en Agriculture Biologique / Research Group on Organic Agriculture, (GRAB), F- 84 911 Avignon, http://grab.agriculturebio.org/

[63] Centre Technique Interprofessionnel de la Vigne et du Vin (ITV France), F-Paris, http://www.itvfrance.com

64 Institut Technique de l'Agriculture Biologique (ITAB), F- 75595 Paris, http://www.itab.asso.fr/

65 Fédération Nationale des Centres d'Initiatives pour Valoriser l'Agriculture et le Milieu rural FNCIVAM

66 Centre National de Ressources en Agriculture Biologique / National Ressource Centre (for organic farming, CNRAB), F - 63370 Lempdes, http://www.agribio.com/

67 Pôle scientifique Agriculture biologique Massif Central / Cooridnation of organic Farming research in the Massif Central (GIS BIO Massif Central) , F- 43 100 Fontannes, http://www.itab.asso.fr/PoleABMassifCentral.htm

68 Association de Producteurs pour le Développement de l'Agriculture Biologique dans l'Ain, l'Isère, la Savoie et la Haute-Savoie // Producer Associtation for the Development of Organic Farming ADABIO, F- 38036 Grenoble, http://www.adabio.com/

69 Centre Régional de Recherche et d'Experimentation en agriculture biologique, Route de Mirande, 32 020 AUCH cedex 09, http://orgprints.org/6745/

4.2.3 Ministry of Research: "RARE programme"

The programme Network Agri-Food Research Europe (RARE: Réseau Agro-alimentaire Recherche Europe) did not exclusively deal with organic farming. The total national costs are approximately € 0.32 million. The projects are listed in Annex 1. The breakdown by subject areas is as follows:

Table 10: Budget distributed at subject areas (2000-2004)

Areas	Projects[70]	Targeted funding amount (in € 1,000)	National total costs (in € 1,000)
6 Food systems	RARE	53	323
Total			323

These programmes involved approximately four research scientists corresponding to approximately 36 person months. The researchers belong to six different institutes:

- Research institute and school of higher eduction: National Institute for Agricultural Research (INRA)
- Professional and expertise organisms: FNAB71, Biocoop72, Secodip73, Agence Bio74, SYNABIO75
- Development body: GRET76

4.3 Regional Programmes 2000 - 2003

This listing of regional programmes for organic farming is not exhaustive.

4.3.1 Pôle Bio Massif Central Programme

The total costs for organic farming research in the Massif Central Region, carried out by the Pôle Bio Massif Central, the regional coordination body of organic farming research, were approximately € 1.7 million in the period 2000-2003.The projects are listed in Annex 1. The breakdown by subject areas is as follows:

70 For project details please see annex 1.

[71] Fédération Nationale d'Agriculture Biologique / National Federation of Organic Farming (FNAB), F-75011 Paris, http://www.fnab.org/

[72] Biocoop - Premier réseau des magazines bio en France / Network of Organic Shops in France, F-92220 Bagneux, http://www.biocoop.fr/

[73] Secodip, TNS World Panel, F-Chambourcy, http://www.secodip.fr

[74] Agence Bio / Agency for Organic Food and Farming, F-93100 Montreuil sous Bois, http://www.agencebio.fr

[75] SYndicat NAtional des transformateurs de produits naturels et de culture BIOlogique / National association of processors of organic food, F-75003 Paris, http://www.synabio.com

[76] Groupe de recherche et d'échanges technologiques / Group for Research and Technology Exchange (GRET), F-75010 Paris, http://www.gret.org/

Table 11: Budget according to at subject areas, Regional Programme Pôle Bio Massif Central 2000-2003

Areas	Projects77	Total costs (in € 1,000)
1 Farming systems	4, 6, 7, 14	665
2 Animal husbandry	1, 2, 3, 5 ,8 ,9	270
3 Crop husbandry	10, 11, 12, 13	562
8 Knowledge management	15	193
Total		1,700

4.3.2 GRAB-Programme

The total regional costs for the research carried out by Research Group on Organic Agriculture (GRAB[78]) were approximately € 2.4 millions for the period 2000 - 2003. The project list appears in Annex 1. The breakdown by subject areas is as follows:

Table 12: Budget according to subject areas, Regional Programme GRAB 2000-2003

Areas	**Projects[79]**	**Total costs (in € 1,000)**
1 Farming systems		484
3 Crop husbandry	1 to 20	1,138
4 Soil	21, 22	242
5 Environmental aspects	23, 24, 25	112
8 Knowledge management	26 to 31	484
Total		2,400

4.4 Regional Programmes 2004 - 2006

The listing of regional programmes related to organic farming research 2004 to 2006 is not exhaustive.

4.4.1 Pôle Bio Massif Central

The total regional costs in the massif Central Region are approximately € 1 million. The project list is available in annex 1. The breakdown by subject areas is as follows:

[77] For project list see annex 1.

[78] Groupe de Recherche en Agriculture Biologique / Research Group on Organic Agriculture (GRAB), F- 84 911 Avignon, http://grab.agriculturebio.org/

[79] For project list see annex 1.

Table 13: Budget according to subject areas, Regional Programme Pôle Bio Massif Central 2004-2005

Areas	Projects[80]	Total costs (in € 1,000)
1 Farming systems	4, 6, 7, 14	491
2 Animal husbandry	1,2,3,5 ,8,9	170
3 Crop husbandry	10, 11,12, 13,	240
8 Knowledge management	15	123
Total		1,000

4.4.2 GRAB Programme

The total regional costs for the research carried out by the Research Group on Organic Agriculture (GRAB[81]) are approximately 2.5 millions for this period. The listing of the projects appears in Annex 1. The breakdown according to subject areas is as follows:

Table 14: Budget according to at subject areas, GRAB Programme, 2004-2006

Areas	**Projects**	**Total costs (in € 1000)**
1 Farming systems		490
3 Crop husbandry	1 to 20	952
4 Soil	21, 22	245
5 Environmental aspects	23, 24, 25	245
8 Knowledge management	26 to 31	490
Total		2,500

5 Financing

For information about the financing see Annex 2 distribution of budgets per year and per theme.

6 Research Facilities

In the following chapters some research facilities available to organic farming research are listed. The list is not exhaustive.

6.1 Organic fruit tree production trials

Long-term organic fruit tree production trials have been carried out since 1994 at the Gotheron experimental station of National Institute for Agricultural Research (INRA). The aims are:

(i) to identify and analyse the key problems (mainly related to pest control and soil fertility) for two perennial crops, apple and peach; and

[80] For project list see annex 1.

[81] Groupe de Recherche en Agriculture Biologique / Research Group on Organic Agriculture (GRAB), F- 84 911 Avignon, http://grab.agriculturebio.org/

(ii) to assess the effect of organic production in the orchard on its arthropod community.

Organic orchards now cover 3.2 hectares of the experimental station.

The measurements concern tree growth, soil nutrients, yield and the fruit quality (sugar, acidity, average weight, mineral contents).

6.2 Organic research farms

6.2.1 Platform on organic sheep production at the National Institute for Agricultural Research (INRA)

The organic research platform for sheep production was set up in 1999. The research takes place at three sites:

1) The Farm of Redon (INRA Centre of Theix[82] in the Region Auvergne, altitude 800 m) has been converted to organic farming since January 2002. There are 200 ewes (Limousine breed) producing 320 lambs a year and 30 red deer. 90 hectares are available for research, of these 2.5 hectares for crops. There are sheds and barns for the sheep but the deer stay outside during the winter. The research takes a systemic approach, comparing two reproduction systems (one lambing per year, half of them in spring, the others in autumn versus three lambings in two years). Research themes include performance regarding reproduction or lamb growing. Further themes are fodder production, animal health, economic results, quality of products and environmental aspects. The work is carried out in cooperation with three farms and three agricultural schools (in three departments of the Massif Central). On average each farm has 70 hectares and 300 ewes.

2) At the INRA experimental farm at Orcival (Unité Experimentale Les Monts Dore, also in the Auvergne[83]; altitude between 1,000 and 1,480 m) 14 hectares and 100 ewes are devoted to organic farming trials. The total – conventional - area available to this experiment farm is 680 hectares. It has also 110 dairy cows and 140 suckler cows managed conventionally. The organic research programme is devoted to the study of the quality of the products, comparing 50 ewes managed organically (9 hectares) with 50 ewes (6.4 hectares) managed the conventional way. It was not possible to certify the 9 hectares used by the organic flock because of the conventional comparison flock compared. This project started in the year 2000. The main results should be available in 2005 and 2006.

3) A monitoring network of farms was set up in 1988. In 2004, this network consisted of 18 organic and 31 conventional farms, some of them located in the plains, some located in the mountains. The aim is to compare (in a long term study) the structures, the functioning and the technical and economic performances of the farms. The data for organic farms are obtained by INRA in collaboration with partners around the Massif Central. These activities are coordinated by the Centre of organic farming in the Massif Central (Pôle Agriculture Biologique Massif Central). There is, in the same INRA team, an equivalent network of farms dealing with suckler cow production (80 conventional farms and six organic and other organic farms in relation with other partners).

6.2.2 Organic research farm on the conception, the management and the evaluation of more sustainable mixed farming systems at INRA

At Mirecourt in the East of France, the INRA organic research farm conducts research on the conception, the management and the evaluation of more sustainable mixed farming systems. The

[82] http://www.clermont.inra.fr/internet/unitesducentre/listeunites.htm

[83] http://www.clermont.inra.fr/internet/unitesducentre/ueorcival.htm

farm covers 225 hectares, and its stock comprises 100 dairy cows with. Two different farming systems are studied, and the research station operates as two model farms: (i) 40 dairy cows on 75 hectares of permanent sward and (ii) 60 dairy cows with 55 hectares of permanent sward and 95 hectares for two crop rotations with different proportions of legumes, cereals, temporary sward and cash crops. (Start of the conversion period 2004, end of the conversion period 2007).

6.2.3 Organic research farms with organic crop and animal production at agricultural colleges

Several farms of agricultural colleges have organic crop and animal production. Most of them have partnerships with research institutes. Three research structures develop programmes on these farms:

- The scientific organic centre of the region Massif Central (P□le Agriculture Biologique Massif Central) has at its disposition the farms of Bioude, Sainte Affrique and Rochefort Montagne's college (average 70 ha and 300 ewes, year of conversion, 2002 (Rochefort), 1998 (Brioude), 1976 (Saint-Affrique). See above "Organic farming sheep production platform at INRA" for more details).
- The organic platform of Inter Bio Bretagne (inter professional and regional organisation) is based at the agricultural farm of the agricultural college of Suscinio Morlaix. Six hectares are devoted to experimentations concerning screening and evaluation of vegetables varieties.
- The Regional Center of research and experimentation in organic farming in the Midi-Pyrénnées, the South West of France CREAB[84], is based at the agriculture college of Auch Beaulieu. A part of the 55-hectare farm has been converted to organic farming since 1999. The trials include screening of varieties, testing organic manure on soft wheat, testing crop rotations, studying mechanical weed control, characterizing nitrogen leaching after leguminous plants, evolution of the fertility of the farm since its conversion. CREAB[85] is affiliated to the Technical Institute of Organic Agriculture (ITAB) which is specialized in arable crops. CREAB is an association, whose members include interest groups of organic farmers, economic organisations, chambers of agriculture, technical institutes and agricultural schools. The scientific partners are INRA and several Agricultural Technical Institutes. Farmers are partners.

6.2.4 Organic research farm on bovine meat production at the chamber of agriculture

Two other organic experimental farms are devoted to bovine meat production. The aim of these two farms is to work out reliable technical references.

The farm of Bordes (Departement of Indre) is associated to the Technical Institute for Crops an Forage ARVALIS[86] and to four local chambers of agriculture (Departements Indre, Cher, Creuse, Haute-Vienne). One of the two fields of the farm was converted to organic farming in 1998. There are about 60 limousine cows on 116 hectares. The farm of Thorigne (departement Maine-et-Loire) was initiated in 1998 by the chamber of agriculture of Maine-et-Loire. It has 54 hectares divided into two sites and 23 limousines cows.

[84] Centre Régional de Recherche et d'Experimentation en agriculture biologique, Route de Mirande, 020 AUCH cedex 09, tp://orgprints.org/6745/

[86] ARVALIS-Institut du végétal / Technical Institute for Cereals and Forage, F-75116 Paris, http://www.arvalisinstitutduvegetal.fr/fr/contact.asp

7 Initiation of Research and Stakeholder Engagement

Within the Ministry of Agriculture and Fisheries, the Teaching and Research Department (DGER) is in charge of the national programme on organic farming. The priorities are set on the basis of a survey carried out at the National Institute for Agricultural Research (INRA) and the Technical Institute of Organic Agriculture (ITAB).

The INRA priorities are based on proposals from research teams and institutions. The results of the survey were discussed at scientific seminars held in 2000 and 2003, of which the proceedings were published. Research gaps are identified, and may concern topics which cannot be covered by the present teams within INRA. The final proposal is elaborated by INRA's Internal Committee on Organic Farming (CIAB) and then submitted to the committee of the Teaching and Research Department (DGER) of the Ministry of Agriculture and Fisheries.

The ITAB survey is carried out by investigating the expectations of professionals, gathered in the technical committees and members (regional committees). ITAB's governing board elaborates the final proposal and submits it to DGER.

8 Selection Criteria and Evaluation Procedures

The procedure described above is applied in principle each third year. The following steps are applied.

Table 15: Time table for evaluation procedures of the projects (each third year)

	DGER's[87] coordination committee	ITAB[88]	INRA[89]-CIAB[90]	ACTA[91]
Fall (year n-1)		Compilation of the expectations of the professionals/ organic sector	Compilation of research needs from the researchers' points of view	Working out the research needs from the researchers' points of views
Mid January	Summing up the proposals, discussion and decision			
15 January			Call (Deadline 08/03) for Expressions of Interest (EoI)	
15 January– 8 March	Teams elaborate and submit their EoI			
8 March			The EoI are received and forwarded to the DGER's committee	

[87] Teaching and Research Department (DGER) of the Ministry of Agriculture and Fisheries.

[88] Technical Institute of Organic Agriculture (ITAB)

[89] National Institute for Agricultural Research (INRA)

[90] INRA's Internal Committee on Organic Farming (CIAB)

[91] Union of the Technical Institutes for Agriculture (ACTA)

Mid March			Scientific experts appointed by INRA; EoI sent to the experts	
End of April	Assessments received by the DGER committee	Following up committees (researchers and professionals) are set up Professional expertise (according to the expectations)	Expert assessments are received back CIAB meeting: working out of the scientific assessment and proposals	Assessments received by the ACTA committee, which produces its own assessment
Beginning of May	General meeting DGER / Professional organisations (ITAB and others)			
Beginning of May	DGER committee proposals validated: organisation of scientific seminars , with full projects to be sent by mid September			
Mid May – end of June	Scientific seminars			
Summer	Full projects to be produced			
Mid September			Full Projects to be received	
30 September			CIAB committee appoints experts	ACTA committee appoints experts
End October			CIAB committee: assessment of the projects	
Beginning of November				ACTA committee: assessment of the projects
End of November	DGER committee takes the decision			
December				ACTA scientific committee (for the overall programme) takes the decision
Beginning of January	Selected projects start			

On the basis of the national call for offers issued each third year, the research teams apply with an expression of interest.

Project assessment criteria

Table 16: Project assessment criteria

Main criteria	Specific questions
1. Scientific quality of the project	Quality of the literature analysis Are the objectives clear, well argued Is the methodology satisfactory? Is the project innovative?
2. Relevance of the project :	Is the project in the framework of the call for proposals? Is it well adapted to the professionals' expectations? Quality of the partnership (are the stakeholders active and diversified) Can the goals be reached within the duration of the project?
3. Quality of the project's management	Consistency between the goals and the technical / financial means devoted to the project Relevance of the planning Organisation of the project / breakdown of the work
4. Financial assessment	Are the expected means realistic according to the goals and methods
5. Overall assessment	Strengths and weaknesses of the project

9 Utilisation of Research

In the majority of cases, the dissemination of research towards the professionals (farmers, producers, advisors, professional organisations, technical institutes) is done directly by partnerships between both, researchers and professionals.

At the same time, dissemination can be done by other ways:

- Written support
    - Publications in traditional reviews or technical reviews
    - Synthesis of results and attractive leaflets
- Meetings
    - Seminars and conferences
    - National or regional technical days
    - Visits of sites (farm walks)
    - Through the specific activities of different organisations:
    - Associations: Inter Bio Bretagne (IBB) which unites the organic sector in Brittany or the regional Federation of organic farmers of Bretagne (FRAB)
    - Technical institutes: ITAB (Technical Institute of Organic Agriculture)

10 Scientific Education and Research Schools

There are different types and levels of education and training in France.

10.1 Education and training in agricultural colleges and high schools

Sixty agricultural colleges and schools of higher education are involved in different levels of professional training in organic farming. These schools are organized in a network called FORMABIO. The majority of these schools are under the auspices of the Ministry of Agriculture and Fisheries; some of them are private. 60% of these schools are involved in the training of adults, 40% in the education of young people.

They issue several types of diplomas / professional certificates: the **baccalauréat** (BAC: equivalent to the leaving certificate). The higher diploma is the "BTSA", a higher national diploma specialized in agriculture and environmental studies.

These diplomas are generally not specific in organic farming. These trainings lead to the profession of (higher) technicians in agriculture.

10.2 Engineering schools

Several agricultural engineering schools are involved in organic faming training. Some of them such as ESA (Angers), ISA (Lille), ISARA (Lyon)92 and ESAP (Purpan) are private, others such as ESIPTA (higher school for engineers and technicians in agriculture), several ENSA[93] and ENITA94 and ENITA (Engineering schools for Agriculture), the INA-PG (National Institute of Agronomy), Paris, are directly linked to the Ministry of Agriculture and Fisheries. Most of them offer specific courses about organic farming. ISARA has a teaching unit specialized in organic farming. These schools have the Master Degree in Engineering that leads to the profession of agricultural engineers. These diplomas are not specific to organic farming.

10.3 Training for professionals

Professional training is carried out at agricultural colleges and engineering schools. Such training is also offered by specific professional and training organisations such as the Research Group on Organic Agriculture (GRAB), BIOCIVAM, the Union of Private Training Schools UNMFREO, the French network of specialised organic food shops BIOCOOP, the National Federation of Organic Farming FNAB[95] and APCA (councils for farmers).

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[92] Institut supérieur d'agriculture (ISARA), F- 69288 Lyon, http://www.isara.fr

[93] Ecole Nationale Supérieure Agronomique, several locations in France.

[94] Ecole nationale d'ingénieurs des travaux agricoles (ENITA). There are several ENITA : Bordeaux, Clermont Ferrand , Dijon

[95] Fédération Nationale d'Agriculture Biologique / National Federation of Organic Farming (FNAB), F-75011 Paris, http://www.fnab.org/

11 Annex 1: Research Programmes Related to Organic Farming: Project Lists

11.1 National Programme 2000-2003

11.1.1 Programme“Agribio I” (INRA and ACTA)

Project Number	Internal projects (INRA, 2000–2003)	National targeted funding (Total additional costs, in €) INRA	National total costs (in €)	Person-month (during the totality of the project)	Research scientists and Engineers
AB1-1	Cereal production: kinetics of crop requirements and soil nitrogen mineralisation rates	19,800	679,800	88	9
AB1-2	Fruit growing: fertilisation, fruit quality, hedgerows, biodiversity	19,800	102,300	11	4
AB1-3	Livestock production: sheep farming, extensive production, production periods, animal feeding, health.	19,800	1,069,800	140	23
AB1-4	How to improve organic farming standards to meet consumer requirements?	10,672	70,672	8	3
AB1-5	Development of production systems in potato growing	11,434	221,434	28	3
AB1-6	Plant breeding for potato growing	41,178	416,178	50	5
AB1-7	Environmental risk assessment in dairy farming	7,622	142,622	18	3
AB1-8	Organic milk quality and supply chain management	7,620	187,620	24	3
AB1-9	Plant breeding in cereals, cabbage, cauliflower	14,300	149,300	18	7
AB1-10	Influence of wheat cultivation management on mycotoxins	5,145	567,645	75	5
AB1-11	Cultivation of organic oilseed rape	6,700	621,700	82	6
AB1-12	Influence of organic farming on nitric waste in soil	9,900	309,900	40	4
AB1-13	Development of organic rice and hard wheat in the Camargue (marshlands in southern France)	3,200	723,200	96	6
AB1-14	Organic fertilisation in vegetable growing	6,860	224,360	29	4

Project Number	Internal projects (INRA, 2000–2003)	National targeted funding (Total additional costs, in €) INRA	National total costs (in €)	Person-month (during the totality of the project)	Research scientists and Engineers
AB1-15	Organic feed quality for pig farming	4,572	570,822	75.5	5
	Collaborative projects (Call opened by INRA and ACTA, 2001-2003)				
AB1-16	How to reduce the use of copper	126,489	2526,489	320	30
AB1-17	Controlling grapevine yellows	51,539	921,539	116	
AB1-18	Production of seeds and plants in organic farming	261,697	703,447	58.9	36
AB1-19	Assessment of wheat genetic resources adapted to organic farming	22,900	2,366,2900	312	10

11.1.2 Programme“INRA – PSDR” (Research on regional development, not exclusively devoted to organic farming)

Project number	Projects INRA	National targeted funding (Total additional costs, in €)	National total costs, in €	Person-month	Research scientists and Engineers
PSDR-1	Project “ARPENT Bio”: Market and supply chains dynamics in the “Pays de la Loire” region	562,188	1,777,188	162	10
PSDR-2	Organic cereals and milk	26,059	129,559	13.8	2

11.1.3 Programme “ACTA” (separate)

Project Number	Projects ACTA 2000-2004	National targeted funding (Total additional costs, in €)	National total cots, in €	Person-month	Research scientists and Engineers
ACTA-1	Comparison of control strategies against the thistle (Cirsium arvense (L.) Scop.) in organic crop systems	112,127	370,877	34.5	7
ACTA-2	Regional raw materials and supply in pig and birds organic productions	207,588	612,588	54	13
ACTA-3	Plants and seeds	625,66	396,316	44.5	11

11.1.4 Ministry of Research: Global "AQS programme" (not totally devoted to organic farming)

Project Number	Project	National targeted funding, in €	National total costs, in €	Person-month	Scientists and engineers
AQS-1	AQS - bio future trends for the organic market and consumer learning	80,798	260,798	24	8
AQS-2	Control of corn production in organic farming and of processes of grinding adapted to the manufacture of nutritional high density floor	90,000	315,000	30	

11.2 National Programme 2004 - 2007

11.2.1 Programme "Agribio II" (INRA, ACTA, ACTIA)

Number	Collaborative projects INRA-ACTA-ACTIA	National targeted funding (INRA), in €	National total costs, in €	Person-month (during the totality of the project)	Scientists and engineers
AB2-1	Improving the quality of organic bread	212284	1,022,284	108	28
	Collaborative projects INRA-ACTA				
AB2-2	Fertilisation in organic farming	173,905	1,478,905	174	29
AB2-3	Fruits plants improvement	33,766	1,212,766	157.2	16
AB2-4	Conversion in organic farming	96,490	1,191,490	146	21
AB2-5	Analyzing the impact of organic farming on the environment (in breeding production)	117,780	522,780	54	6
	INRA internal projects				
AB2-6	Improving the potato seeds	10,000	325,000	42	8
AB2-7	Interactions genotype-milieu and participatory selection	60,500	1,065,500	134	10

AB2-8	Quality of cheep products	20,000	342,500	43	13
AB2-9	Global Control of parasitism	13,000	253,000	32	10

11.2.2 Programme“ADAR”

Project number	Projects	National targeted funding	National total cots	Person-month	Scientists and engineers
ADAR-1	To improve quality of food	248,828	736,328	65	9
ADAR-2	Optimization of Tillage in Organic Farming (ploughing, no - techniques)	297,686	882,686	78	14
ADAR-3	Low input straw cereals	69,386	301,886	31	4

11.2.3 Ministry of Research: Global “RARE program” (not totally devoted to organic farming)

Project number	Projects	National targeted funding	National total costs	Person-month	Scientists and engineers
RARE	Future trends for the organic market II	52,767	322,767	36	4

11.3 Regional Programmes 2000 – 2006

11.3.1 Pôle Bio Massif Central – Programme 2000-2006

Number	Projects
1	Forage system characteristics and evolutions in organic dairy cattle farms in Centre of France
2	Demonstration in organic calf and beef cattle finishing system in Limousin
3	Demonstration in organic meat sheep and beef cattle finishing system in dry area of South Centre of France
4	Technical and economical reference acquisition in beef cattle, diary cattle and meat sheep organic systems
5	Experimental mixed crop-livestock farm in organic beef cattle system
6	In-farm research in organic meat sheep and beef cattle husbandry practices in Limousin
7	In-farm research in organic meat sheep and beef cattle husbandry practices in South Centre of France
8	Technical, economic, feeding and sanitary set of reference in organic dairy sheep production
9	Milk quality and livestock farming practices in organic farming

10	Grassland mechanical maintenance in organic farming
11	Permanent pasture organic fertilisation in organic farming
12	Organic high quality wheat and mixed cereals: crop management sequence, varieties, quality and yield evaluations
13	Varieties evaluation of mixed and forage cereals and protein-rich plants in organic farming
14	In-farm research in organic "crop science"
15	Coordination of organic farming system research in Centre of France

11.3.2 GRAB – Programme 2000-2006

	Projects
1	Improvement of soil structure: new tillage systems in organic vegetables
2	Soil management in orchards: e.g. weed control, green manuring.
3	New organic orchard management: semi-extensive orchards (e.g. low input, low density)
4	Improvement of organic tree nursery management
5	Evaluation of vegetable varieties suitable for organic farming (e.g. lettuce, tomatoes)
6	Evaluation of fruit varieties suitable for organic farming
7	Use of biocontrol agents in organic greenhouses and in orchards
8	Biocontrol of soilborne diseases and pests (*Nematodes, Sclerotinia*, ...) in organic vegetables and vines.
9	Study and evaluation of plant elicitors against diseases (e.g mildew, blight)
10	Evaluation of plant extracts (including phytotherapy) to control pests (e.g. aphids, lepidopers, pear midge) in vegetable production and orchards.
11	Control of gasteropodes in organic farming
12	Analysis and control of wood diseases (e.g. Esca...) in vines
13	Apple and pear scab control through orchard management (e.g. leaves removal)
14	Pear orchard management to control *Monilia*
15	Use of clay to control pests in orchards
16	Vole control in orchards
17	Fruit fly control in Mediterranean orchards

18	Mating disruption in orchards
19	Control of *Scaphoideus* / in vineyards
20	Control of post-harvest diseases (*Monilia*) on peach: antagonists and heat treatments
21	Improvement of soil fertility (e.g. green manuring)
22	Improvement of soil nutrition and organic fertilizer use in vegetable and fruit growing
23	Improvement of functional biodiversity in organic fields (e.g. flower strips, edges)
24	Effect of farming systems (organic, conventional) on biodiversity
25	Bioplastics and biodegradable mulches on organic vegetables
26	Regional organic fruit growing farm network
27	Organisation of organic congresses for farmers, technicians, researchers and other actors
28	Organisation of farmers' meetings
29	Teaching for students and farmers
30	Consulting for organic farming
31	Writing of books, technical leaflets for in organic farming

12 Annex 2: Research Programmes on Organic Farming in France: Budget Distribution per Year and Thematic Area

12.1 Budget distribution per year and per thematic area – National programmes

Additional costs distribution per year and per theme (in €)

	2001	2002	2003	2004	2005	2006	2007	*Total*
1-Farming system					25,500	25,500		***51,000***
2-Animal husbandry	12,186	115,980	103,794		6,500	6,500		***244,960***
3-Crop husbandry	75,659	402,093	336,334	88,903	147,281	58,379	23,129	***1,131,776***
4-Soil					99,229	99,229	99,229	***297,686***
5-Environmental aspects	8,761	8,761			9,000	9,000		***35,522***
6-Food systems	248,139	261,168	257,358		225,468	225,468	82,943	***1,300,544***
7-Value, standards and certification	5,336	5,336						***10,672***
8-Knowledge management								
Total	***350,081***	***793,338***	***697,486***	***88,903***	***512,978***	***424,076***	***205,301***	***3,072,160***

Total costs: distribution per year and per theme (in €)

	2001	2002	2003	2004	2005	2006	2007	*Total*
1-Farming system					595,745	595,745		***1,191,490***
2-Animal husbandry	820,311	1,126,605	306,294		126,500	126,500		***2,506,210***
3-Crop husbandry	13,451,736	14,545,526	1,196,090	1,345,836	4,283,428	795,879	100,629	***35,719,123***
4-Soil					294,229	294,229	294,229	***882,686***
5-Environmental aspects	432,911	559,256	126,345		261,390	261,390		***1,641,291***
6-Food systems	1,525,311	1,590,091	901,608		1,089,218	1,089,218	245,443	***6,440,889***
7-Value, standards and certification	35,336	35,336						***70,672***
8-Knowledge management								
Total	***16,265,605***	***17,856,814***	***2,530,337***	***1,345,836***	***6,650,510***	***3,162,961***	***640,301***	***48,452,361***

12.2 Budget distribution per year and per thematic area – Regional programmes

12.2.1 Pôle Bio Massif Central: Additional costs: distribution per year and per thematic area (in €)

	2000	2001	2002	2003	2004	2005	*Total*
1- Farming systems	37 502 €	53,357 €	113,207 €	103,102 €	66,408 €	116,319 €	**489,895 €**
2- Animal husbandry	22 867 €	64,638 €	0 €	51,098 €	29,530 €	39,681 €	**207,814 €**
3- Crop husbandry	38 722 €	39,411 €	68,988 €	110,371 €	0 €	52,024 €	**309,516 €**
8- Knowledge management	53 357 €	0 €	46,954 €	39,000 €	36,600 €	50,000 €	**225,911 €**
Total	***152 448 €***	***157,406 €***	***229,149 €***	***303,571 €***	***132,538 €***	***258,024 €***	***1,233,136 €***

12.2.2 Pôle Bio Massif Central: Total costs: distribution per year and per thematic area (in €)

	2000	2001	2002	2003	2004	2005	*Total*
1- Farming systems	49,775 €	99,092 €	257,938 €	258,300 €	249,310 €	242,548 €	**1,156,963 €**
2- Animal husbandry	33,996 €	125,617 €	0 €	111,037 €	70,738 €	99,040 €	**440,428 €**
3- Crop husbandry	87,353 €	173,557 €	105,334 €	196,101 €	110,156 €	129,748 €	**802,249 €**
8- Knowledge management	66,620 €	0 €	67,000 €	60,000 €	61,100 €	62,500 €	**317,220 €**
Total	***237,744 €***	***398,266 €***	***430,272 €***	***625,438 €***	***491,304 €***	***533,836 €***	***2,716,860 €***

12.2.3 GRAB: Total costs: distribution per year and per thematic area (in €)

	2000	2001	2002	2003	2004	2005	2006	*Total*
1-Farming systems	100,000 €	120,000 €	120,000 €	144,000 €	176,000 €	158,000 €	156,000 €	***974,000 €***
2-Animal husbandry								
3-Crop husbandry	250,000 €	300,000 €	300,000 €	288,000 €	352,000 €	316,000 €	312,000 €	***2,118,000 €***
4-Soil	50,000 €	60,000 €	60,000 €	72,000 €	88,000 €	79,000 €	78,000 €	***487,000 €***
5-Environnemental aspects			40,000 €	72,000 €	88,000 €	79,000 €	78,000 €	***357,000 €***
6-Food systems								
7-Value, standards and certification								
8-Knowledge management	100,000 €	120,000 €	120,000 €	144,000 €	176,000 €	158,000 €	156,000 €	**974,000 €**
Total	***500,000 €***	***600,000 €***	***640,000 €***	***720,000 €***	***880,000 €***	***790,000 €***	***780,000 €***	***4,910,000 €***

CORE Organic Country Report

Country Report on Organic Food and Farming Research in Germany

30. November 2005

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Source: CMA-Fotoservice

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1 History

1.1 Research about organic agriculture in Germany: Overview

Recently, research about organic farming has gained strong impulses in Germany. Schools of higher education, as well as state research centres steadily opened up, and with the funding under the Federal Organic Farming Scheme BÖL[1] organic farming research has been strengthened substantially.

Research about organic farming has a long tradition in Germany, going as far back as into the twenties of the last century. At that time the first – mainly biodynamic – pioneers started to carry out research on their farms. The Institute for Biodynamic Research IBDF[2] founded in 1950, was one of the first private research institutions in the world. Also the first university chair for organic agriculture emerged in Germany, where until today more specific professorships exist than in any other country. Since the beginning of the nineties, the status quo of research in organic farming is regularly documented through the scientific conference on organic farming[3], which is coordinated by the Foundation Ecology & Agriculture (SÖL)[4]. Further, in the context of EU projects, contacts to research colleagues outside of Germany were intensified. Several public bodies with research divisions got involved in organic farming. Through funding within the Federal Organic Farming Scheme (BÖL) organic research experienced a major upswing since 2002.

Germany has also played an important role in the development of international organic farming research. In 1984, the 5th International Scientific Conference of the International Federation of Organic Agriculture Movements (IFOAM)[5] took place in Witzenhausen. In 2003 the International Society of Organic Agriculture Research (ISOFAR)[6]) was founded in Berlin. It promotes and supports research in all areas of organic agriculture by facilitating global cooperation in research, methodological development, education and knowledge exchange; supporting individual researchers through membership services, publications and events, as well as integrating stakeholders in the research process.

1.2 Milestones of organic farming research in Germany

- 1950: Institute for Biodynamic Research founded in Darmstadt
- 1981: First Chair for Organic Farming established at the University of Applied Sciences Kassel-Witzenhausen (Professor Dr. Hartmut Vogtmann)
- 1984: 5th International Scientific Conference of the International Federation of Organic Agriculture Movements: "The Importance of Biological Agriculture in a World of Diminishing Resources" held in Witzenhausen
- 1995: Elaboration of standards for site-specified fertilisation systems in organic farming in Europe based on long-term field experiments" (FERSY) started; coordinated by IBDF, one of the first European funded organic farming research projects
- 1987: Second Chair for organic Farming at the University of Bonn; now Institute of Organic Farming (Prof. Dr. Ulrich Köpke); many others to follow
- 1991: First Scientific Conference on Organic Farming in the German-speaking Countries held in Witzenhausen; now taking place bi-annually

[1] Bundesprogramm Ökologischer Landbau (BÖL), Bonn, www.bundesprogramm-oekolandbau.de/

[2] Institut für Biologisch-Dynamische Forschung (IBDF), Darmstadt, www.ibdf.de

[3] Wissenschaftstagung zum ökologischen Landbau, www.wissenschaftstagung.de

[4] Stiftung Ökologie & Landbau (SÖL), Bad Dürkheim, www.soel.de

[5] International Federation of Organic Agriculture Movements (IFOAM), Bonn, Germany, www.ifoam.org

[6] The International Society of Organic Agriculture Research (ISOFAR), Bonn, Germanys, www.isofar.org

- 1996: First Diploma course in organic farming established at the University of Kassel / Witzenhausen, gradual conversion of the whole agricultural faculty to Organic Agricultural Sciences[7]
- 2000: Institute of Organic Farming (OEL-FAL) funded as part of the Federal Agricultural Research Centre
- 2002: First phase (until 2003) of research projects launched under the Federal Organic Farming Scheme (180 projects)[8]
- 2003: Internet platform for organic farming research "forschung.oekolandbau.de" established under BÖL, including a German language version of the Organic Eprints archive
- 2003: First coordination conference of the actors in state, funded organic farming research ("Ressortforschung"), now taking place annually
- 2003: International Society of Organic farming Research (ISOFAR)[9] founded in Berlin
- 2004: Second phase of the Federal Organic Farming Scheme launched (until 2007), with numerous organic farming projects
- 2005: 8th Scientific Conference (Wissenschaftstagung) held in Kassel and for the first time Organic Eprints is used for the submission of papers
- 2006: Federal Organic Farming Scheme, including the research part, continued under the new German government

1.3 Research and research coordination on EU level

The first EU-Project about organic agriculture coordinated by a German Institute (IBDF) was the project "Elaboration of standards for site-specified fertilisation systems in organic farming in Europe based on long-term field experiments" (FERSY)[10]. The project running from 1995 to 1997 was one of the first European funded projects considering organic farming. In the framework of the project, results of different long-term field experiments were gathered. Several other projects followed of which the project "Effects of the CAP-reform and possible further developments on organic farming in the EU"[11] finalised in 2000, needs special citation. Coordinated by the University of Hohenheim, this project for the first time gave a broad overview about the situation of organic farming in Europe. Furthermore, the first proposals for the European Action Plan for Organic Farming were developed.

Another milestone in EU-Research was the approval of the project QLIF [12] with a budget of € 18 million. This project focuses on research strategies to enhance food quality and security. From Germany, the University of Kassel, the University of Hohenheim and the Institute for Organic Farming from the University of Bonn are involved.

[7] Fachbereich Ökologische Agrarwissenschaften, Universität Kassel, Witzenhausen, http://www.uni-kassel.de/fb11cms/?c=63

[8] See also Forschungsmanagement und Wissenstransfer im Bundesprogramm Ökologischer Landbau (BÖL), http://www.bundesprogramm-oekolandbau.de/forschung.html

[9] Society of Organic farming Research (ISOFAR), Bonn, www.isofar.org

[10] Elaboration of standards for site-specified fertilisation systems in organic farming in Europe based on long-term field experiments (Fersy), Institute for Biodynamic Research Darmstadt, www.ibdf.de/v1/fersy.htm

[11] Effects of the CAP-reform and possible further developments on organic farming in the EU, c/o Fachgebiet Produktionstheorie und Ressourcenökonomik im Agrarbereich, Universität Hohenheim, www.uni-hohenheim.de/i410a/eu_org/Fair3_Index.htm

[12] Food from low-input and organic production systems: Ensuring the safety and improving quality along the whole chain, Quality Low Inout Food (QLIF), c/o University of Newcastle UK, www.qlif.org/

2 Organisation

2.1 Organisational structure

In Germany, organic farming research is carried out by private institutions, universities, state research centres and agencies (see graph below).

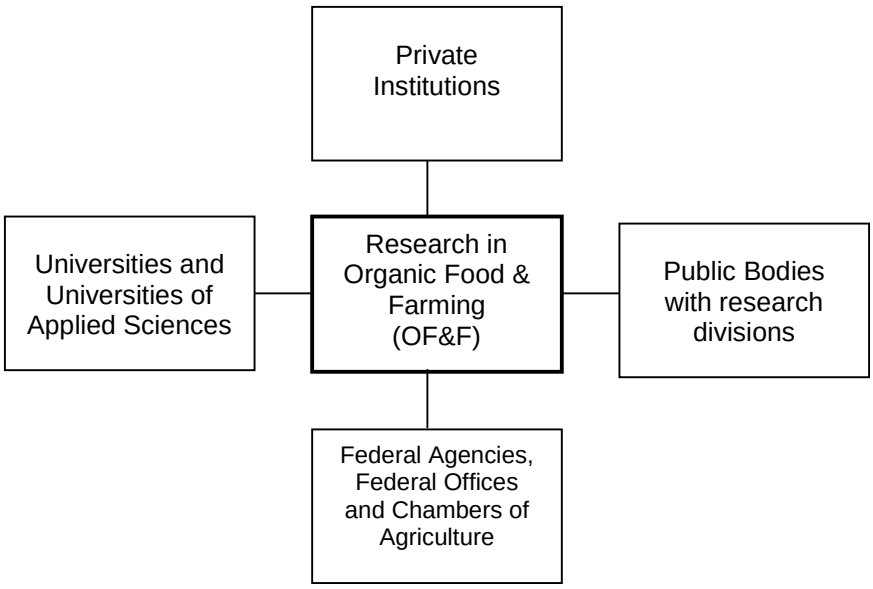


Figure 1: Organisation of organic farming research in Germany

2.2 Funding

The total funding of organic agricultural research in Germany includes funds for the financing of specific projects and institutional funding of research institutions. Research in organic farming is therefore funded as follows:

- Institutional support on governmental level (e.g. state research institutes, Leibniz-Institutes etc.)
- Institutional support on the level of federal states ("Bundeslaender"), e.g. universities, state research institutes, chambers of agriculture etc.
- Project financing on governmental level by
  - the Federal Agency for Agriculture and Food (BLE)[13], under the jurisdiction of the Federal Ministry of Food, Agriculture and Consumer Protection BMELV[14]
  - the German Federal Agency for Nature Conservation (BfN)[15] and the Federal Environmental Agency (UBA)[16], under the jurisdiction of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)[17]
- project financing by further public and private sponsors (e.g. private foundations, associations, German Federal Environmental Foundation (DBU) [18].

[13] Bundesanstalt für Landwirtschaft und Ernährung (BLE), Bonn, www.ble.de

[14] Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (BMVEL), Bonn / Berlin, http://www.bmelv.de

[15] Bundesamt für Naturschutz (BfN), Bonn, www.bfn.de

[16] Umweltbundesamt (UBA), Dessau, www.uba.de

[17] Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU), Berlin, www.bmu.de

[18] Deutsche Bundesstiftung Umwelt (DBU), Osnabrück, www.dbu.de

2.3 Who coordinates the research?

In general, research planning in Germany is conducted by the Federal Ministry of Education and Research (BMBF)[19]. Coordinating ministries for research in Organic Food and Farming are e.g. the Ministry of Food, Agriculture and Consumer Protection (BMELV) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The main project executing organisations under the jurisdiction of these ministries are the Office of the Federal Organic Farming Scheme (GS BÖL[20]), the German Federal Agency for Nature Conservation (BfN) and the Federal Environmental Agency (UBA).

2.4 Which are the main stakeholder organisations?

In Germany a large number of stakeholder organisations for organic farming exists, many of them are united in the Federation of Organic Food Enterprises (BÖLW)[21]. Its members are the main organic producer organisations (Bioland, Biopark, Demeter, Ecoland, Gäa, Naturland) and processing / trading associations[22].

Other relevant organisations are the International Federation of Organic Agriculture Movements (IFOAM)[23], which is based in Germany, the Foundation Ecology & Agriculture (SÖL), the Research Institute of Organic Agriculture (FiBL)[24], the Foundation on Future Farming (ZLS)[25] and the Schweisfurth Foundation[26].

2.5 Research Institutions in Germany

2.5.1 Private institutions

With the Institute for Biodynamic Research (IBDF) in Darmstadt the eldest research institute for organic farming was founded in 1950. Apart from IBDF, other biodynamic institutes like the Cereal Breeding Institute Darzau[27] and the Kwalis Institute[28], as well as the organic Foundation Ecology & Agriculture (SÖL) carry out organic farming research. Important impulses for organic research were given by the Swiss Research Institute of Organic Agriculture (FiBL)[29], founded in 1973. In 2001, FiBL Germany was founded, focussing on knowledge transfer and the provision of solid scientific services regarding food production. Nationwide there is an engagement of agricultural advisory services in applied research activities. Compared to e.g. Switzerland and the USA (Rodale Institute), the importance of private research institutes involved in organic farming is, however, rather small.

[19] Bundesministerium für Bildung und Forschung (BMBF), Berlin, www.bmbf.de

[20] Geschäftsstelle Bundesprogramm Ökologischer Landbau (GS BÖL) in der Bundesanstalt für Landwirtschaft und Ernährung (BLE), Bonn, http://www.bundesprogramm-oekolandbau.de

[21] Bund Ökologische Lebensmittelwirtschaft (BÖLW), Berlin, www.boelw.de

[22] Assoziation ökologischer Lebensmittel Hersteller / Association of Organic Food Producers AÖL, Oberleichtersbach, http://www.aoel.org; Bundesfachverband Deutscher Reformhäuser e.V. / Federation of German Reform Houses (refo), Zarrentin, www.refo.de; Bundesverband Naturkost Naturwaren Herstellung und Handel e.V. / Federation of Organic Processors and Traders, Cologne, http://www.n-bnn.de; Verband der Bio-Supermärkte / Association of Organic Supermarkets, Darmstadt

[23] International Federation of Organic Agriculture Movements (IFOAM), Bonn, www.ifoam.org

[24] Forschungsinstitut für biologischen Landbau (FiBL), Frankfurt, www.fibl.org

[25] Zukunftsstiftung Landwirtschaft (ZLS), Bochum, http://www.zs-l.de

[26] Schweisfurth Stiftung, Munich, www.schweisfurth.de/

[27] Getreidezüchtungsforschung Neu-Darchau, http://www.darzau.de/

[28] KWALIS - Untersuchung von Lebensmitteln, Dipperz, www.kwalis.de

[29] Forschungsinstitut für biologischen Landbau (FiBL), CH-Frick, www.fibl.org

2.5.2 Universities and Universities of Applied Sciences

In contrary to many other European countries, the major part of research on organic farming in Germany takes place at universities and universities of applied sciences. This is clearly mirrored by the number of research papers documented in the Organic Eprints database.

In 1981, the former director of FiBL Switzerland, Hartmut Vogtmann, received a call for the world-wide first professorship of "Alternative Agriculture" at the University of Applied Sciences Kassel-Witzenhausen (since 2002: University Kassel) – a milestone in the history of organic farming research. Since the nineties, the University continuously increased its activities related to teaching and research about organic agriculture. With the generation change of professorships starting in 1997, a "conversion" of the whole faculty to a "Division of Organic Agriculture" took place. Today, the Faculty of Organic Agriculture offers a Bachelor and two Master programmes in organic farming, which are accredited according to European Norms (ECTS – European Credit Transfer System).

The professorship in Witzenhausen was followed by another chair for organic farming in 1987 at the University of Bonn (now: Institute for Organic Farming IOL)[30]. Throughout the nineties, several professorships and coordination posts at schools of higher education were established (Eberswalde, Giessen, Kiel, Munich, Nuertingen, Osnabrueck, Stuttgart-Hohenheim, Wiesbaden-Geisenheim). With more than 20 dedicated professorships and coordination posts, Germany is world-wide leading in the field of higher education for organic agriculture. As the market for organic products is growing on a world-wide scale, the University of Hohenheim offers a new Master programme "Organic Food Chain Management" (MSc), which started in 2005, in order to prepare students of all nationalities for this challenging task.

2.5.3 Public bodies with research divisions on federal level

On federal level, several public bodies with research divisions are involved in organic farming. At the Institute of Farm Economics and the Institute of Rural Studies[31] of the Federal Agricultural Research Centre (FAL)[32], several scientists have been intensely involved in organic farming since the late eighties. One milestone for the development of research on organic farming was the establishment of the Institute for Organic Agriculture of the FAL (OEL-FAL) at Trenthorst in the year 2000. Also, at the Federal Biological Research Centre for Agriculture and Forestry (BBA), questions regarding biological plant protection are worked on for a longer period of time. Specifically, the Institute for Integrated Plant Protection and the Institute for Biological Plant Protection deal with these issues. Several divisions of the Research Centre for Nutrition and Food (BFEL)[33] and the Federal Centre for Breeding Research on Cultivated Plants (BAZ)[34] are currently involved in research projects within the BÖL.

The activities of the organic farming research activities at the federal research centres are coordinated by the Institute for Organic Agriculture of the FAL (OEL-FAL) and annually a conference takes place where the latest research results are presented. The proceedings of these conferences are all documented in the Organic Eprints database.

[30] Institut für Organischen Landbau (IOL), Universtität Bonn, http://www.iol.uni-bonn.de/

[31] Institut für ländliche Räume & Institut für Betriebswirtschaft, Bundesforschunganstalt für Landwirtschaft (FAL), Braunschweig, www.fal.de

[32] Bundesforschungsanstalt für Landwirtschaft (FAL), Braunschweig, www.fal.de und www.oel.fal.de

[33] Bundesforschungsanstalt für Ernährung und Lebensmittel (BFEL), Karlsruhe, http://bfa-ernaehrung.de/

[34] Bundesanstalt für Züchtungsforschung an Kulturpflanzen (BAZ), Quedlinburg, http://www.bafz.de/

2.5.4 Research at federal level ("Bundeslaender")

In several German federal states employees of federal agencies, federal offices and chambers of agriculture work in the field of organic agriculture. Here, mainly applied research is carried out. Knowledge transfer into practice has a high priority, which can be seen in the establishment of leading and demonstration farms, as well as in the strong collaboration with the agricultural advisory service. Since 1998, scientists of the federal institutes have been coordinating their activities in the nation-wide "Experimental Task Force Organic Farming" [35].

2.5.5 List of main research institutions according to research themes (Selection)

Multidisciplinary institutes in Germany:

Bundesforschungsanstalt für Landwirtschaft (FAL), Federal Research Institute for Organic Agriculture, Institut für ökologischen Landbau:

PD Dr. Gerold Rahmann, Trenthorst / Wulmenau, 23847 Westerau, Germany

Plant production, plant protection, plant breeding etc.:

Universität Kassel, Fachbereich Ökologische Agrarwissenschaften, Fachgebiet Ökologischer Land- und Pflanzenbau:

Prof. Dr. Jürgen Heß, Dr. Christian Schüler et. al., Nordbahnhofstr. 1a, 37213 Witzenhausen, Germany

Christian-Albrechts-Universität Kiel, Institut für Pflanzenbau und Pflanzenzüchtung, Grünland und Futterbau/Ökologischer Landbau:

Prof. Dr. Friedhelm Taube, Hermann Rodewald Str. 9, 24118 Kiel, Germany,
Tel: +49 431 880 2133, Fax: +49 431 880 4658
http://www.grassland-organicfarming.uni-kiel.de/

Universität Kassel, Fachbereich Ökologische Agrarwissenschaften, Fachgebiet Ökologischer Pflanzenschutz:

Prof. Dr. Maria Finckh, Dr. Helmut Saucke, Dr. Christian Bruns
Nordbahnhofstr. 1a, 37231 Witzenhausen, Germany, http://mars.wiz.uni-kassel.de/phytomed/

Rheinische Friedrich-Wilhelms-Universität Bonn, Institut für Organischen Landbau:

Prof. Dr. Ulrich Köpke, Katzenburgweg 3, 53115 Bonn, Germany, http://www.iol.uni-bonn.de/

Justus-Liebig-Universität Gießen, Professur für Organischen Landbau:

Prof. Dr. Günter Leithold, Karl-Glöckner-Str. 21 C, 35394 Gießen, Germany,
http://www.uni-giessen.de/orglandbau/

Biologische Bundesanstalt für Land- und Forstwirtschaft, Institut für integrierten Pflanzenschutz:

PD Dr. habil. Stefan Kühne, Stahnsdorfer Damm 81, 14532 Kleinmachnow, Germany
http://www.bba.de/oekoland/index.htm

[35] Arbeitsgruppe Versuchsansteller im Ökologischen Landbau im Verband der Landwirtschaftskammern, Leipzig, http://orgprints.org/2354/

Institut für Biologisch-Dynamische Forschung (IBDF) e.V.:

Dr. Johannes König, Dr. Hartmut Spieß, Dr. Georg Eysel, Dr. Joachim Raupp
Brandschneise 5, 64295 Darmstadt, Germany, http://www.ibdf.de

Getreidezüchtungsforschung Darzau, Gesellschaft für goetheanistische Forschung e.V.:

Dr. Karl-Josef Müller, Darzau Hof, 29490 Neu Darchau, Germany, http://www.darzau.de

Fachhochschule Osnabrück, Studiengang Gartenbau:

Prof. Dr. Christian Wonneberger, Oldenburger Landstr. 24, 49090 Osnabrück, Germany,
http://www.al.fh-osnabrueck.de/gartenbau.html

Fachhochschule Eberswalde, Fachbereich Landschaftsnutzung und Naturschutz:

Prof. Dr. Hans-Peter Piorr, Friedrich-Ebert-Straße 28, 16225 Eberswalde, Germany,
http://www.fh-eberswalde.de/lanu/

Fachhochschule Osnabrück, Studiengang Landwirtschaft: Fachgebiet Umweltschonende Landbewirtschaftung:

Prof. Dr. Dieter Trautz, Am Krümpel 31, 49009 Osnabrück, Germany,
http://www.al.fh-osnabrueck.de/index.html

Hochschule für Technik und Wirtschaft Dresden (FH); Fachbereich Landbau/Landespflege, Stiftungsprofessur Ökologischer Landbau:

Prof. Dr. agr. Knut Schmidtke, Pillnitzer Platz 2, 01326 Dresden, Germany,
http://www.htw-dresden.de/pillnitz/

Animal husbandry, animal feeding, livestock breeding, animal health etc.:

Universität Kassel, Fachbereich Ökologische Agrarwissenschaften, Fachgebiet Tierernährung und Tiergesundheit:

Prof. Dr. Albert Sundrum, Dr. Christian Krutzinna, Nordbahnhofstr. 1a, 37213 Witzenhausen, Germany

Universität Kassel, Fachbereich Ökologische Agrarwissenschaften, Fachgebiet Nutztierethologie und Tierhaltung:

Prof. Dr. Ute Knieriem, Nordbahnhofstr. 1a, 37213 Witzenhausen, Germany

Bundesforschungsanstalt für Landwirtschaft (FAL), Institut für Tierschutz und Tierhaltung:

Dr. Lars Schrader, Dörnbergstraße 25-27, 29223 Celle, Germany, http://www.tt.fal.de

Fachhochschule Osnabrück, Studiengang Landwirtschaft, Fachgebiet Umweltschonende Tierproduktion:

Prof. Dr. Robby Andersson, Am Krümpel 31, 49090 Osnabrück, Germany

Fachhochschule Weihenstephan, Fachbereich Land- und Ernährungswirtschaft, Fachgebiet Tierernährung:

Prof. Dr. Gerhard Bellof, Am Hofgarten 1, 85350 Freising, Germany
http://www.fh-weihenstephan.de/le/projekte/lw/tierernaehrung01.html

Gesellschaft für Ökologische Tierhaltung (GÖT), e.V.:

c/o Bernhard Hörning, FH Eberswalde, FB Fachbereich Landschaftsnutzung und Naturschutz, Studiengang Ökolandbau und Vermarktung, http://www.goet.de/

Fachhochschule Eberswalde, Fachbereich Landschaftsnutzung und Naturschutz, Studiengang Ökolandbau und Vermarktung, Ökologische Tierhaltung:

Prof. Dr. Bernhard Hörning, Friedrich-Ebert-Straße 28, 16225 Eberswalde, Germany,
http://www.fh-eberswalde.de/oelbv/

Farm economics, rural development, marketing, policy areas etc.:

Bundesforschungsanstalt für Landwirtschaft (FAL), Institut für Betriebswirtschaft:

Dr. Hiltrud Nieberg, Bundesallee 50, 38116 Braunschweig, Germany

Universität Kassel, Fachbereich Ökologische Agrarwissenschaften, Fachgebiet Agrar- und Lebensmittelmarketing:

Prof. Dr. Ulrich Hamm, Prof. Dr. Bernd Wirthgen i. R., Steinstraße 19, 37213 Witzenhausen, Germany

Universität Hohenheim, Fachgebiet Produktionstheorie und Ressourcenökonomik im Agrarbereich:

Prof. Dr. Stephan Dabbert, Schloß-Osthof-Süd/Schwerzstrasse, 70593 Stuttgart, Germany

Universität Hamburg, Institut für Allgemeine Botanik, Forschungsschwerpunkt Biotechnik, Gesellschaft und Umwelt (FSP BIOGUM):

Dr. Heike Kuhnert, Ohnhorststr. 18, 22609 Hamburg, Germany

Christian-Albrechts-Universität Kiel, Institut für Agrarökonomie:

Dr. Maike Bruhn, Wilhelm-Seelig-Platz 6/7, 24098 Kiel, Germany
http://www.uni-kiel.de/juniorprofessur_agrar/index.shtml

Fachhochschule Eberswalde, Fachbereich Landschaftsnutzung und Naturschutz, Studiengang Ökolandbau & Vermarktung:

Prof. Dr. Anna Maria Häring, Friedrich-Ebert-Straße 28, 16225 Eberswalde, Germany
http://www.fh-eberswalde.de/oelbv/

Consumer protection, human nutrition, organic food quality, food analysis etc.:

Universität Kassel, Fachbereich Ökologische Agrarwissenschaften, Fachgebiet Ökologische Lebensmittelqualität und Ernährungskultur:

Prof. Dr. Angelika Ploeger, Dr. Johannes Kahl, Nordbahnhofstr. 1a, 37213 Witzenhausen, Germany, http://www.wiz.uni-kassel.de/nue/

Bundesforschungsanstalt für Ernährung, Institut für Verfahrenstechnik:

Dr. Esther Mayer-Miebach, Haid-und-Neu-Str. 9, 76131 Karlsruhe, Germany
http://www.bfa-ernaehrung.de/Bfe-Deutsch/Institute/Ivt/Ivt-ma/ivt-mayer-miebach.htm

Büro Lebensmittelkunde und Qualität:

Dr. Alexander Beck, zum Pilsterhof 7, 97789 Oberleichtersbach, Germany
http://www.bl-q.de/

Viniculture etc.:

Forschungsanstalt Geisenheim, Fachbereich Weinbau / Getränketechnologie, Institut für Biologie, Fachgebiet Phytomedizin:

Prof. Dr. Beate Berkelmann-Loehnertz, Von-Lade-Str. 1, 65366 Geisenheim, Germany

Fachhochschule Wiesbaden, Fachbereich Weinbau und Getränketechnologie, Professur für ökologischen Weinbau:

65366 Geisenheim, Germany,
http://fh-web1.informatik.fh-wiesbaden.de/go.cfm/fb/13/sprachid/1.html

Practical research, scientific services, transfer of knowledge etc.:

FiBL Deutschland e. V., Forschungsinstitut für biologischen Landbau:

Dr. Robert Hermanowski, Galvanistrasse 28, 60486 Frankfurt/Main, Germany, www.fibl.org

Stiftung Ökologie & Landbau (SÖL):

Dr. Uli Zerger, Weinstraße Süd 51, 67089 Bad Dürkheim, Germany, www.soel.de

Arbeitsgruppe der Versuchsansteller im ökologischen Landbau, c/o Sächsische Landesanstalt für Landwirtschaft:

Dr. sc. agr. Hartmut Kolbe, Gustav-Kühn-Str. 8, 04159 Leipzig, Germany

Öko-Institut Freiburg e.V.- Biodiversität, Ernährung und Landwirtschaft (BE&L):

Ruth Brauner, Binzengrün 34a, 79114 Freiburg, Germany

ECOZEPT GbR, Marktforschung im Biomarkt:

Dr. Burkhard Schaer, Oberer Graben 22, 85354 Freising, Germany
http://www.ecozept.com

Kompetenzzentrum Ökolandbau Niedersachsen:

Ulrich Prolingheuer, http://www.oeko-komp.de

Kompetenzzentrum Ökologischer Landbau (KÖL) Rheinland Pfalz:

http://www.soel.de/projekte/wissenschaftstagung.html

3 Research & research financing for Organic Food and Farming

In the following, the research programmes for Organic Food and Farming and their financing by the Ministry of Food, Agriculture and Consumer Protection (BMELV) from 1997 – 2007/2008 will be explained in detail.

In general, there are three main funding pools of the BMELV to support organic farming research projects:

- The **Funding pool "UM"** ("Research and development projects for environmental protection in agriculture") – is a permanent funding source.
- The **Funding pool "EH"** ("Research assignments for advisory and decision-making support at the (BMELV)" - is also a permanent funding source.
- The **Federal Organic Farming Scheme (BÖL)** – is a temporary funding source (2002 – 2007/2008).

3.1 Funding pool "UM" ("Research and development projects for environmental protection in agriculture")

This pool is a permanent funding source for both conventional and organic farming projects (Table 3.1). The goal is to implement new, environmental-friendly solutions (incl. animal welfare) and to transfer current research findings into the agricultural practice. Practitioners and scientists are involved in these projects.

Table 1: Financing of the "UM" funding pool

Year	Total funding of all projects	Funding of organic research projects	Percentage of organic research project funding
1997	1 259 600 €	32 000 €	2.54 %
1998	904 400 €	30 500 €	3.37 %
1999	1 214 100 €	491 300 €	40. 47 %
2000	1 210 300 €	537 300 €	44.39 %
2001	1 306 600 €	562 700 €	43.07 %
2002	1 254 700 €	609 600 €	48.59 %
2003	833 700 €	396 900 €	47.61 %
2004	1 092 300 €	311 800 €	28.55 %
2005	1 292 900 €	159 200 €	12.31 %

3.2 Funding pool “EH“ ("Research assignments for advisory and decision-making support at the Ministry of Food, Agriculture and Consumer Protection (BMELV)")

This pool is also a permanent funding source for both conventional and organic farming projects. Based on this pool, research projects are realised only for specific topics, which would help meet special needs for advisory and decision-making support at the Ministry of Food, Agriculture and Consumer Protection (BMELV). Table 2 shows the funding of this pool for the years 1997-2005.

Table 2: Financing of the “EH” funding pool

Year	Total funding of all projects	Funding of organic research projects	Percentage of organic research project funding
1997	4 400 800 €	0 €	0.00 %
1998	4 457 500 €	32 000 €	0.72 %
1999	3 345 000 €	32 000 €	0.96 %
2000	3 080 100 €	16 500 €	0.54 %
2001	3 597 400 €	166 000 €	4.61 %
2002	4 370 000 €	141 300 €	3.23 %
2003	4 639 800 €	182 900 €	3.94 %
2004	4 396 200 €	44 300 €	1.01 %
2005	4 781 300 €	6 400 €	0.13 %

3.3 The Federal Organic Farming Scheme (BÖL)

3.3.1 About the Scheme

The Federal Organic Farming Scheme (BÖL) is a temporary funding source (2002 – 2007/2008) especially to support the whole organic farming sector (incl. research) in Germany. The organic production system is recognised to give high priorities to environmental protection measures, covering goals of sustainability set by the government.

In the summer of 2001, the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) commissioned a project team comprised of representatives from associations and science and headed by the Federal Agricultural Research Centre (FAL) to develop a proposal for a package of measures to foster organic farming in Germany. A hearing of representatives from trade and industry, associations, consultancy, science and administration built the foundation for the team's work.

Based on this work, the former Federal Minister of Consumer Protection, Food and Agriculture Renate Künast decided to incorporate the proposed measures into the Federal Organic Farming Scheme (BÖL) to translate them into practice. This scheme supplements existing support measures with the aim of improving the basic conditions necessary for expanding organic farming. At the same time, it strives to increase supply and demand on a balanced, sustainable basis.

3.3.2 Funding of the Scheme

Table 3 gives an overview of the BÖL in total, including the research programmes, while table 4 shows the funding according to the research areas.

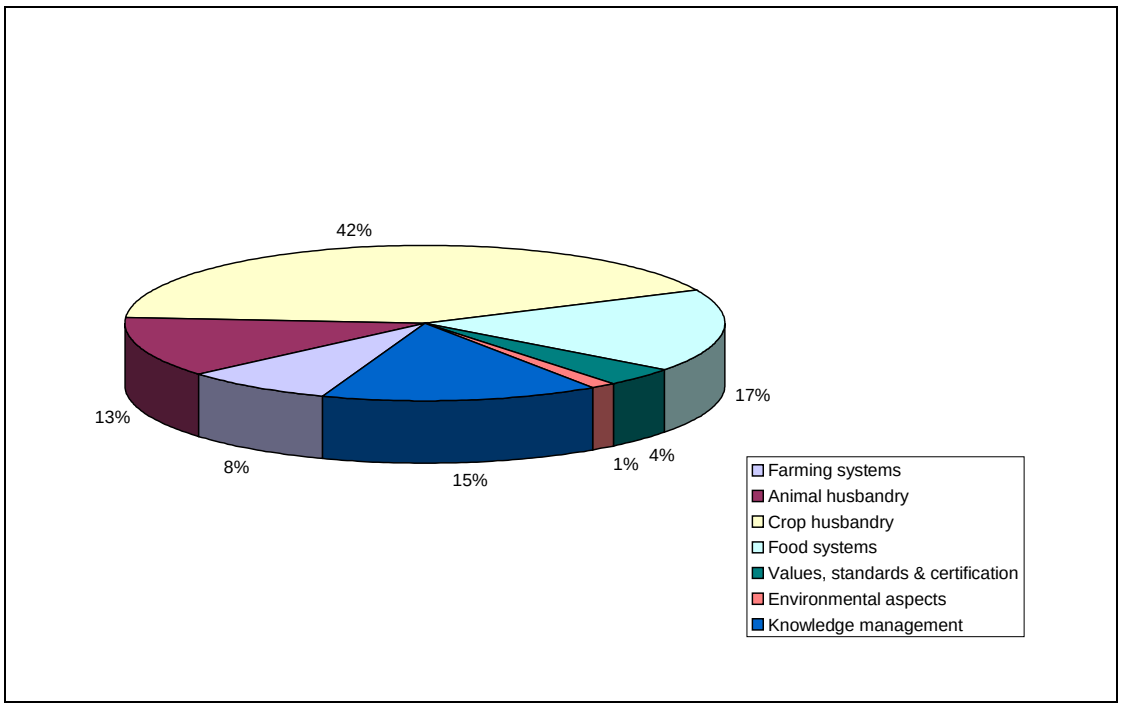
Table 3: Financing of the Federal Organic Farming Scheme

Year	BÖL – all measures	BÖL – Research & Development / technology and knowledge transfer
2002	35 Mio. €	approx. 10 Mio. €
2003	35 Mio. €	approx. 10 Mio. €
2004	20 Mio. €	7 Mio. €
2005	20 Mio. €	7 Mio. €
2006	20 Mio. €	7 Mio. €
2007	16 Mio. €	7 Mio. €
2008	12 Mio. €	7 Mio. €
2009	10 Mio. €	7 Mio. €
2010	10 Mio. €	7 Mio. €

These measures tackle all levels of organic farming, from the production to the consumption of organic products. The scheme includes training and information measures. Emphasis is also being placed on research promotion, the development of new technologies and steps to translate research findings into practice. Currently, the BÖL is the main pool of the BMELV for organic research funding.

Table 4: Financial overview of funding through the Federal Organic Farming Scheme (BÖL) and UM pool for organic research in Germany between 2002–2005, distributed according to the www.orgprints.org categories

Subject area	Projects	Amount in Euro per year			
		2002	2003	2004	2005
Farming systems	21	609 185	1 538 777	276 786	263 388
Animal husbandry	52	746 798	1 754 302	608 331	1 105 348
Crop husbandry	176	2 475 262	5 644 808	2 613 772	3 397 224
Food systems	46	1 241 945	2 069 385	965 821	1 474 610
Values, standards & certification	21	398 999	410 529	215 956	314 188
Environmental aspects	8	48 040	225 838	38 200	137 787
Knowledge management	41	791 514	2 459 749	801 359	962 930
Total	365	6 311 743	14 103 388	5 520 225	7 655 475



Graph 1: Total amount of funding by BÖL & UM in €

Supporting research and development projects is a superordinate measure of the BÖL. This, along with measures to foster the transfer of technology and know-how, is to fill existing gaps in people's knowledge about and experience with organic farming:

3.3.3 Support for R&D projects and for measures encouraging the transfer of technology and knowledge into the organic farming sector

Gaps in people's knowledge and experience are considered to be major obstacles to the growth and expansion of organic farming. These gaps are to be filled by research being conducted and their result dissemination. Government assistance for research and development is particularly necessary because industrial research findings benefit conventional farming much more than the organic farming sector. Given that organic farming largely foregoes the use of purchased inputs and in light of the comparatively small size of this sub sector, industry seldom finds it to be worthwhile to invest in research and development in this field. The lack of knowledge in turn hampers the continued development of organic farming and production growth.

In light of this situation, the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) has developed a "Programme to Support Research and Development Projects and Measures for the Transfer of Technology and Knowledge in the Organic Farming Sector" within the BÖL on the basis of the proposals submitted by the project team. This programme pursues the goal of filling important knowledge and experience gaps in the organic farming sector and, in the process, boosting its competitive strength, from production to sales, on a lasting basis. It targets university institutes, research facilities, private enterprises, organisations and research centres that conduct departmental research under the Ministry's purview. This programme was originally set up to run until the end of 2003 (1st phase).

In general, the Federal Organic Farming Scheme (BÖL) aims to remedy weak points within a short timeframe that particularly hinder the expansion of organic farming. However, some of these weak points, especially in the field of research and development (R&D), cannot be constructively eliminated in the course of a two-year programme. For this reason, the "Programme to Support Research & Development Projects and Measures for the Transfer of Technology and Knowledge in the Organic Farming Sector" within the BÖL was laid out right from the start for a period of more than two years and – together with other parts of BÖL - was continued up to 2007 / 2008 (2nd phase).

Based on this programme, especially in the 1st phase (2002 – 2003) research contracts were awarded for specific topics, which would help meet special needs for extension and decision-making support for the Ministry of Food, Agriculture and Consumer Protection.

The Ministry can, on the basis of a special funding guideline, award grants or allocations for other projects arising from this programme, which do not directly contribute to meet the Ministry's needs in this area. This guideline differentiates between projects within and outside of the production, processing and marketing of products listed in Annex I of the EC Treaty (projects within the agricultural sector vs. projects outside the agricultural sector).

In keeping with the objectives pursued by the Federal Organic Farming Scheme, funding is provided for projects in the following areas in particular:

- Projects to boost the efficiency of agricultural production methods with the aim of increasing the organic produce market's prospects for growth
- Projects that seek new strategies for making species-specific animal husbandry compatible with profitability and improved quality
- Projects that balance as optimally as possible organic farming with the objectives of nature conservation
- Projects that seek solutions to urgent problems arising in connection with storage, first marketing stage, processing and marketing of organic produce
- Projects that support and foster the transfer of technology to practice
- Projects that fill existing gaps in people's knowledge about the problems that organic farming faces at political, legal and societal levels

3.3.4 Main subject areas of Research & Development within BÖL

The list of research themes of the Federal Organic Farming Scheme below shows the themes and challenges that are currently dealt with in the Federal Organic Farming Scheme:

- Crop Husbandry
  - Plant protection and plant breeding
  - Plant strengthening preparations
  - Plant nutrition
- Animal husbandry
  - Animal health and rearing of livestock
  - Animal feeding and breeding
- Food Systems: quality and processing
- Values, standards and certification
- Knowledge management: Extension
- Marketing / Consumer behaviour
- Food Service Sector
  - Youths and organic products
  - Other activities in context of Organic Food Management

Information on each research project carried out as well as the final reports are available at the Organic Eprints Archive (summaries are available in English) [36].

[36] http://orgprints.org/view/projects/BOEL.html

3.3.4.1 Crop Husbandry

Projects on crop husbandry are generally over-represented within the German Federal Organic Farming Scheme. The structure of the German research system in organic agriculture is responsible for this: research capacities for crop production are much larger than in other areas, such as animal husbandry and food research. The main cause for this imbalance can be seen in the fact that organic farming developed as an alternative, especially to conventional plant production.

Plant protection and plant breeding [37]

Under the given economic conditions, there is a need for the plant production in Germany to rationalise the measures for soil cultivation up to crop harvest. The growing demand for products of consistent and high quality with a constant availability can only be fulfilled by organic farmers, if their stock is healthy and if they can achieve high yields.

Hence, questions concerning plant health and safety are of main importance. This was reflected by the fact that from a total of about 180 projects, 50 were dedicated to organic plant protection[38].

The use of chemical pesticides as applied in conventional farming is forbidden in organic agriculture. Conventional pesticides treat plants symptom-oriented, while organic agriculture works system-oriented. This systemic view includes soil cultivation, crop rotation, the use of disease-resistant varieties and the specific application of biological pesticides, up to the appropriate living conditions for beneficial insects.

The projects of the Federal Scheme try to meet these challenges. Therefore, several projects were initiated in the field of plant breeding. These dealt with breeding of resistant crops, such as wheat and fruits. Furthermore, one project addresses the issue, to what extent organic wheat varieties need a special and modified licensing procedure, which is to be established deviant from conventional testing parameters.

Plant protection in organic agriculture is far more complex than in conventional agriculture. Thus, its needs to be system-oriented (see above). Nevertheless, it is important that single measures need to be effective. This means that also biological plant protection preparations have to be reliable in their effect. If this is not the case, then they are unable to fulfil their duty in context of soil cultivation, crop rotation and selection of crop variety.

Many projects of the Federal Organic Farming Scheme are devoted to the research of active ingredients, their formulations in different concentrations, their compositions, etc. Highly qualified scientists work in such projects. Based on their research topic, the scientists have to analyse and solve relatively isolated research questions. The research results that were presented in October 2003 and November 2004, showed that this can constitute a danger: The clarification of chemical interrelations should not lead to the systematic approach of organic plant protection to get lost. Plant protection in organic farming should not be a simple substitution of conventional methods. The results of single research questions should be re-included into the overall context of the biological cultivation system and also include existing practical experiences.

The example of plant protection makes it quite clear, how important and equally difficult it is to fill the requirement of interdisciplinary and transdisciplinary research with life.

A special problem within organic plant protection is the intensive use of the heavy metal copper. At present, there is no alternative available. Nevertheless, there are several projects in viticulture and potato cultivation that deal with the following aspects: which kind of formulation will reduce the copper concentration in the applied medium, what kind of cropping measures will help avoid the use of copper and which active substance can replace copper in the long-term.

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[37] http://orgprints.org/view/projects/de-boel-pflanze-pflanzenschutz.html and http://orgprints.org/view/projects/de-boel-pflanze-pflanzenzuechtung.html

[38] http://orgprints.org/view/projects/de-boel-pflanze-pflanzenzuechtung.html

Plant strengthening preparations

The organic pesticides available on the German market are subject to great dynamism. A large amount of preparations, as well as small manufacturers that are sometimes unable to keep up on the market, are responsible for this. Furthermore, there is a category in Germany called "plant strengthening preparations"HYPERLINK, which are subject to a simplified licensing procedure. This category does not exist in all European countries. Therefore, it is difficult for the farmers to choose the appropriate preparation for their crops and their cultivation. In order to improve this situation a project[39] was started, which provides a list containing all relevant information about plant strengthening preparations and other inputs available on the market, their components, their effect as defined by the manufacturer, as well as independent research results. This input list is continuously updated. Thus the farmer and the advisor have a transparent overview of all currently available preparations and their usability.

Furthermore, the development of improved mechanised repelling methods against thistle (*Cirsium* arvense (L.) Scop)[40] and dock varieties (*Rumex* spp.)[41], as well as the use of developed prototypes, was subject of projects within the Federal Scheme.

Plant nutrition [42]

Organic crop production refrains from using supplemental mineral fertiliser, as its availability for the plant is quite predictable. The management within a closed cycle and the use of organic fertilisers is the basis for plant nutrition in organic agriculture.

Due to increasing specialisation, organic farming has to deal with a growing number of farms operating with low or without any animals. Therefore, fertiliser from animal husbandry is hardly available to these farms. They have to focus on organic fertilisers of plant origin, and on the design of a sustainable crop rotation. These issues are taken up by the Federal Scheme: e.g. reasons for a depression in harvest and other cultivation problems on farms operating without animal husbandry are being investigated. Furthermore, the effect of fertilisation from leguminous plants in field vegetables or faba bean meal for different crops are studied[43].

For the prediction of available minerals of the organic material, as well as the soil nutrients available in the long-term, importance is placed on the balance of soil humus. The methods used in conventional agriculture cannot simply be applied here. Systematic research on humus balance has not been done. In order to remove this deficit and to supply the organic farmers, as well as the advisors with a balancing method, which is quite accurate and still practical, a broad project was recently started.

3.3.4.2 Animal husbandry [44]

The role of research about animal husbandry can be deduced from the history of organic farming. It has never played a major role and even lost part of the genetic resources like locally adapted breeds and health features. Compared to the subject of crop husbandry, less project proposals were handed in. One reason for the lower number of research projects on organic animal husbandry under the BOEL is that projects concerning animal husbandry are in general far more expensive than e.g. crop husbandry projects. During the first period of the BÖL (2002-2003) several status quo

[39] http://orgprints.org/6944/; http://www.betriebsmittel.org/

[40] http://orgprints.org/5015/

[41] http://orgprints.org/6167/

[42] http://orgprints.org/view/projects/de-boel-pflanze-pflanzenernaehrung.html

[43] http://orgprints.org/3490/

[44] http://orgprints.org/view/projects/de-boel-tier.html

projects about animal husbandry of cattle, pigs and poultry, as well as aquaculture were realised. The results served as a basis for follow-up projects considering more specific, current and relevant issues.

Animal health[45] and rearing of livestock[46]

In general, it can be observed for all productive livestock that differences in the health status of animals under organic or conventional livestock husbandry differ less than between farms of the same production type. This allows the conclusion that it is mainly a matter of husbandry management determining if an animal is healthy or not.

In the case of cattle husbandry, which plays an important role in organic farming, one research focus is animal health. Mainly udder diseases like mastitis prevent a higher productivity and better quality of the given milk. Therefore, management support systems are developed in running projects and implemented into practice. These tools should enable farmers to establish the basic conditions (building of stables, hygienic aspects, milking techniques) for improved animal health. Only when these preconditions are fulfilled, more advanced treatments (e.g. homeopathy) can be successful in mastitis prophylaxis.

A similar situation can be found in pig husbandry, where project results show that the status of animal health is not yet satisfactory. Considering observations on living animals as well as diagnostic findings of the carcass (liver, lung) it was evident that the presently practised hygienic management and husbandry systems are often not compatible with the requirement for better health conditions under organic farming. In comparison to other countries the basis for organic pig production is comparably narrow in Germany. Only a few hundred farms are involved in breeding of piglets and fattening of pigs. Next to the research itself, knowledge transfer is of main interest. Therefore, different projects of the Federal Organic Farming Scheme include extension service in their research. Furthermore, pig farms from neighbouring countries like Austria and Switzerland are partly included in surveys and evaluations.

The organic rules and regulations for species appropriated husbandry and better animal welfare do not necessarily guarantee advanced animal health. To adjust this imbalance is a challenge the Federal Organic Farming Scheme is facing with the current projects.

Animal feeding[47] and breeding[48]

Following recent regulations for organic animal husbandry it will be compulsory to feed animals with 100% organic fodder. So far, it was possible to use conventional additives. This upcoming restriction means a challenge for all organic farms involved in animal husbandry still reaching high outputs in spite of the low energy density and partly different composition of organic fodder under the circumstances of a permanent tightening market competition.

There are two ways to go in order to solve the existing problems. On the one hand, there are several breeds used in organic farming today, which are not adapted to an optimum in their demands and requirements to the conditions of organic animal husbandry. In lack of adequate breeds, adapted hybrids are used, which have been reared for the demands of conventional circumstances. Features like longevity, robustness, persistent performance and adaptation to extensive husbandry conditions were lost along the way. Therefore, it is of main importance for the establishment of suitable breeds for organic farming to establish breeding programmes and develop breeding criteria under the recognition of still available genetic resources.

[45] http://orgprints.org/view/projects/de-boel-tier-tiergesundheit.html

[46] http://orgprints.org/view/projects/de-boel-tier-tierhaltung.html

[47] http://orgprints.org/view/projects/de-boel-tier-tierernaehrung.html

[48] http://orgprints.org/view/projects/de-boel-tier-tierzucht.html

On the other hand, it is necessary to improve the used fodder in a way that neither deficiency symptoms nor depression of performance will appear. This problem can be clearly demonstrated by the example of feeding layers: When the layers are fed according to organic criteria, a deficit especially in essential amino acids in the fodder is detectable. A supplement, e.g. of synthetically produced methionine, is not allowed. Therefore, two joint projects from the Federal Organic Farming Scheme are searching for ways to extract methionine from natural sources: In one project, different algae species are screened in view of a higher methionine synthesis. Another project is focusing on the search for bacteria showing higher methionine production caused through natural mutation. If these projects are successful, a natural source of methionine might be available in the future. Used as a fodder additive, it could avoid the above-named deficiency symptoms.

3.3.4.3 Food systems: Quality and processing [49]

Within the Federal Organic Farming Scheme far more projects have been submitted and realised regarding food quality than processing. Research about food quality is mainly carried out by universities and public bodies with research divisions concentrating on laboratory investigations. Research about food processing is interesting for companies inventing e.g. new production systems, but only a few project proposals were handed in. Often the support for small innovative food companies goes in conflict with the funding guidelines evaluating the funding as a distortion of competition distinguishing between small-scale business promotion and market intervention.

A comparison of the amount of realised projects in the category food quality and processing with other organic research categories clearly shows a deficit in this area. On the one hand, only a few project proposals have been handed in after the call for this category. This is due to several reasons:

It is and stays difficult to measure the gained health status of organic products objectively beyond the given facts (e.g. less residue and pesticide contamination). It lacks suitable parameters as well as experience concerning relevant methods for measuring quality. Here, it is a great challenge to validate holistic methods for quality analysis, in comparison to already established conventional analysis and make them available for practitioners. Current projects of the Federal Organic Farming Scheme are dealing with these subjects.

On the other hand, organic food processing is partly affected by small structures. Several small companies with many innovative ideas exist. In comparison to experienced third-party fund raisers of universities, these companies have less experience and capacities for the successful application of project proposals. Their project ideas often include features of company promotion hampering the support as a research project. Anyway, at present, the organic food sector is little structured to communicate their problems combined to research institutes and project executing organisations.

An important research focus of the BÖL is the quality of organic food produced. Several investigations already have shown that because of the ban of synthetic pesticides, residue contamination of organic products is considerably less. It is far more difficult to determine, whether organic products have a different composition than conventionally grown products, if the contents of specific components (e.g. secondary plant ingredients) are significantly higher and the consumption of organic food implements have an objectively detectable excess for the health of the consumer. These questions have been and still are being investigated in several projects dealing e.g. with fruit, vegetables, cereals and fish.

In this context, it is important to consider, which analytical methods are being chosen. By using only the methods confirmed for the conventional sector, the acceptance of the results from the organic point of view will be little. Similar scepticism appears from the conventional point of view when only results from holistic methods are being generalised. Therefore, one key project of the BÖL investigates about the differentiation and classification of organic products using validated

[49] http://orgprints.org/view/projects/de-boel-lebensmittel.html

analytical and holistic methods. For comparative measurements, samples of conventional and organic products (wheat, apples, carrots) receive a code and are being analysed by analytical and holistic methods (e.g. copper chloride crystallisation, fluorescence-spectroscopy, physiological amino acid status). The contents of secondary plant ingredients are determined and sensory investigations carried out, in order to do a comparative analysis of plant resources from conventional and organic systems. Furthermore, investigations consider whether the location of production and type of cultivar have a higher or lower impact on the quality of ingredients than the farming technique itself.

3.3.4.4 Values, standards and certification[50]

Twenty-one projects are assigned to this category, consisting of projects concerned with decision support for certification agencies to comply with the GMO prohibition or decision guidance for processors and traders to minimise the risk of GMO blending into the production process. The introduction of a quality management system, as well as databank technical requirements for the development of a trace back system, are current projects considering actual needs. Information supply about organic products without GMO is realised through a handbook for practitioners. Further internet pages have been established presenting overviews about certified companies or judicial laws relevant for import and export countries. Several projects are concerned with the development of methods to verify organic products like eggs and salmon. Others are dealing with the establishment of evaluation systems for approval of technical ingredients, food additives and auxiliary substances, as well as risk management for plant protection residues.

3.3.4.5 Knowledge management: Extension [51]

One main focus of the BÖL is to professionalise knowledge transfer and extension service for organic farming. Several measures and projects already start during the vocational training. An internet based knowledge portal containing teaching material about organic farming for agricultural vocational training was created in order to integrate organic farming subjects into the courses. Furthermore, a trainee programme for young extension workers was realised to optimise their preparation for the extension service. Also, for experienced advisors, further education considering different themes and methodological competence is being offered.

In a project a “management handbook for organic agriculture” was compiled. It lists current practices, cost calculations, construction solutions and economical instruments for consultants and farmers. The handbook is available in the form of a book or an IT-programme. This handbook will be updated regularly.

Research about extension on organic farms amongst others is focussing on the development of new extension tools. Organic farms often have a much more diverse production system than their conventional colleagues. For a competent assessment of once own strengths and weaknesses, it is of importance to separate the different production areas in order to do an economical calculation and to decide about correct inside farming prices for a product changing from one production area of the farm into another one. These questions are attended to by a large joint project including dairy farming, pig production, poultry, as well as field and vegetable crops.

[50] http://orgprints.org/view/projects/boel-12-certification.html

[51] http://orgprints.org/view/projects/de-boel-oekonomie-beratung.html

3.3.4.6 Marketing / Consumer behaviour [52]

The difficult economic situation in Germany has strained the food industry, because consumers have become much more conscious of prices. Mainly discount stores have profited from this development and even registered rising turnovers. The result of this is that production prices came more and more under pressure. For many foods production costs could barely be covered or lost out to cheaper products from abroad.

An opposite trend can be seen in the organic sector: While retail stores in the food sector are having losses, the organic field is recording positive two-digit turnovers. Though there were different food scandals, these only had a short-term effect. More and more consumers are becoming aware of a healthy diet and nourishment. Surely, the Federal Scheme has contributed positively to this development.

The consumer backgrounds are rather losing transparency, as the organic niche has lost its organic "alternative" image. Though there are still convinced organic activists, there are equally those, who are occasional buyers with different familial and educational backgrounds. Even the motives and reasons to buy organic have become diverse. Research projects dealing with the analysis of the qualitative structure of organic consumer behaviour (especially occasional and rare buyers of organic goods) have been realised on survey basis in the Federal Organic Farming Scheme. Furthermore, projects concerning the demand of organic food products have been conducted using panel data and long-term observations.

Another branch of market research deals with the successful marketing initiatives of organic products, as well as the effect in sales promotion and special price offers in retail.

An improvement is also necessary at the interface between producers of organic goods and commercial enterprises. Many consumers are prepared to buy organic products, but do not want to spend the time and effort to comb through the different stores in order to find what they want or need. Therefore, the need exists to bundle the portfolio of goods of the manufacturers and establish communication to retailers. Latter are only interested in clients that are affine to organic goods and want to keep such clients with respective marketing, so that these will buy from the retailer, who offers a large product palette. This sensitive topic was taken up by a broad project of the Federal Organic Farming Scheme, which is currently running.

At the beginning of the Federal Scheme, research projects focused on the primary sector, i.e. the production side. But sustainable agriculture can only develop, if the demand side equally rises. Thus, in 2003/2004, many projects turned towards the marketing issue. In the meantime, the organic niche has started to develop into a branch of its own. The increasing entry of retailers and also of discount stores into the sale of organic goods reflects this as well. Unfortunately, risks evolve next to the many positive opportunities, as conventional agriculture has already experienced since several years: The producing side gets more and more under pressure from the buyer side, because the demand for high quality, consistent and largely produced goods, can only be satisfied, if a constant delivery is warranted. This increases the pressure on rationalisation. Additionally, foreign producers of organic raw materials and goods are also pressing forward onto the German market, which does not facilitate the situation for the German organic farms and businesses.

Many stakeholders fear that German organic farmers will be forced to use conventional methods such as securing short-term harvest maximisation and placing the optimisation of the farm processes in the back. Advances in organic agriculture cannot be achieved if only single production techniques or branches are intensified or changed, without considering the interaction within the entire farming system.

A solution for this conflict of aims is difficult, because economic, political, social and scientific interests have to be aligned. This implies the following for organic research: Scientists, as well as

[52] http://orgprints.org/view/projects/de-boel-oekonomie-marktentwicklung.html and http://orgprints.org/view/projects/de-boel-oekonomie-vermarktung.html

those who decide about financing of research projects in Germany, have to do justice to the area of conflict between the pressure of conventionalising (i.e. organic farming, which is on the legal periphery) and the desired holistic approach for a sustainable and environmental-friendly agriculture.

The stakeholders of the organic food industry are equally challenged: They have not only to convince the consumer of the quality of produced goods, but also of the quality and raised environmental-friendliness of the production process.

This proves to be a difficult task. The occasional buyer's motives to go for organic products are mostly of an egoistic nature. He/she decides on the basis of health, taste etc. Higher or altruistic motives are of secondary nature, such as honouring the ecological and social benefits of organic agriculture. These include protection of natural resources, conservation of biodiversity as well as securing and creating new jobs.

The Federal Scheme supports the difficult task to communicate the process quality as an added value. A model project supports a dairy farm by purposely raising the price of the produced milk by 5 cent/litre. Then, this surcharge is mentioned on the packaging as a direct income transfer for the milk producing farmers. This surcharge is given directly to the regional milk producers so that they are also able to produce cost effectively in the future. The practice was a success, as early fears of a loss in sales by 10-20 % was unfounded. The project idea that a higher price helps to conserve the landscape and secure regional jobs even led to an introduction of new clients for the dairy. Furthermore, new stores took up this milk into their product range, which were then able to sell more milk than before. The sale of the organic milk with a surcharge did not go to the expense of organic milk sales of other dairies.

Basically, this example is transferable to other products as well and shows that even regional sales structures make it possible to use the processing quality of organic farming as a sales criterion.

In times of an increasing globalisation, process quality is not just a matter of environmental-friendly agriculture, but it receives an ethical dimension as well. Many consumers consider the moral reputation of a company. What kind of values does the company represent? Are job and family compatible for his employees? How does he deal with his suppliers? Does the company also take social responsibility with the respective obligation?

Markets do not necessarily orient themselves towards the lowest prices. The person as an entrepreneur, as an employee of a company, as well as a consumer, equally designs the market (un)consciously with his or her specific ethical orientation.

While the conventional sector has been trying to polish its image since several years with specific measures, the organic sector never had this problem. There never was a reputation deficit, as organic agriculture already started off with a highly ethical claim.

Nevertheless, the belief that the product speaks for itself is losing its validity in the increasing globalisation and anonymity. Still, especially the organic branch is very dependant on its social and ethical image. Hence, the implementation of a value management system would be a valuable asset. Within the Federal Organic Farming Scheme a feasibility study was elicited to check, whether there would be a possibility to introduce a certified ethical or value management system for the natural food sector. The aim is to get an active involvement of companies in this sector into the implementation of such an ethical management system. Such a management system can have an internal, as well as an external benefit for the companies: internally it will help the employee to identify him/herself with the employer and the orientation towards its values. Externally, this systematic management of values will help to communicate corporate citizenship, credibility and a moral reputation to the consumer. In the medium-term, the consumer is supposed to identify him/herself with the ethical values of the product connected to the producer, which the consumer will then take into consideration of his purchase decision.

3.3.4.7 Food Service Sector (FSS)

Organic agriculture can only then grow in a sustainable manner and be economically sound, if its products and services are accepted and demanded broadly by society. For this, not only private consumption plays a role, but equally bulk consumers. They play a key role for the stabilisation and increase of this demand.

In order to better use the shown potential of organic products for the FSS in future, several projects (2002 – present) were realised within the Federal Organic Farming Scheme: restraints, success factors and development opportunities for the use of organic goods, questions concerning certification and control of organic products in the food service sector.

Large amounts of food are purchased and processed by catering firms and hotels, canteens, schools, hospitals and other public institutions. They also represent a stable market outlet. Furthermore, they have high requirements of the delivered goods concerning health issues, because of their partly sensitive clientel, which include children, patients, convalescence patients and restaurant guests. Hence, the sales opportunities for organically produced goods are very clear.

Nevertheless, even the partial conversion of public catering to organic products is connected to great challenges: suppliers have to guarantee a homogenous and sufficiently large amount. Furthermore, freshness and quality of the raw materials have to be assured from the producer up to the processing in the canteen kitchen. Even the kitchen staff needs to adapt to a few changes, such as purchase, storage, seasonal availability, menu composition and price calculations, as these deviate from conventional processes. Additionally, a precise communication strategy is necessary for the introduction phase of organic products.

All of the above-mentioned problems can be solved. Still, many kitchen managers and those responsible for the food service sector are reluctant to introduce and use organic products due to the sum of hurdles that need to be overcome.

Another challenge for companies in the FSS that want to process and offer organic goods, are the labelling and certification requirements for such products. According to the legal requirements, all companies in the food service sector need to go through the control system of the EU Regulation on organic agriculture, if they want to use organic products and label them as such. Many companies in this sector that were using organic products, were not certified, as they were unaware of the inspection requirements. The inspection bodies also have large gaps: many do not have specially trained personnel and suitable forms for the FSS. The inspection bodies, which have experience with the food service sector, possess standardised forms for processing companies. According to them, there are four core differences between companies in the FSS compared to other processing companies in the organic food sector:

- Companies in the food service sector generally do not work with fixed recipes
- Labelling cannot be done directly on the product
- There is a large problem with the delivery of the goods
- There is often a lack of documentation, which hampers the control of the flow of goods

In the past, the bureaucratic effort of certification scared off many responsible persons in this sector, who were generally willing to partially or fully convert to organic products. It is interesting to note the result of a survey from 2003, conducted by the Federal Organic Farming Scheme: Two thirds of the managers of establishments rejected the additional effort related to labelling and inspection. Simultaneously though, 60 % of the interviewees signalised a willingness to buy, process and offer organic goods without organic labelling, as they can market them well with the term “organic” in their menus. Apparently, the quality of organic products are convincing enough for the food service sector personnel (while purchasing), as well as for the guests to pay a higher price for a qualitatively higher raw material and accordingly healthy and delicious food.

Youths and Organic Products

Children and youths receive special attention within the FSS projects of the Federal Organic Farming Scheme. On the one hand, healthy nourishment for adolescents is essential, on the other hand, children have quite an influence on the purchasing habit within their families – much more than anticipated at first. And finally, these youths are the clients of tomorrow.

One focal point in the Federal Organic Farming Scheme is an exemplary scheme to introduce organic products for meals in schools and day-care centres. Currently, there is a network of several projects located in rural areas, as well as in large cities like Berlin or Hamburg. The office of the Federal Organic Farming Scheme is organising an exchange of experiences between the different stakeholders of the projects concerning successes and restraints. In order to make opportunities and requirements regarding the implementation of organic goods in schools and day-care centres available to a large public, a booklet is currently being issued.

Other activities in the context of Organic Food Management

The dedication of the Federal Scheme concerning the food service sector, organic catering and gastronomy go far beyond research and exemplary projects. Meanwhile, extensive information is offered in printed format as well as on the internet for bulk consumers from catering, gastronomy, event and food service sectors. These publications cover information for the introduction of organic foods (economics, convenience in canteen kitchens, basics in hygiene and storage, personnel training), as well as precise help in daily planning and work with organic products in communal feeding (e.g. shopping schedule, assortment list, recipe finder, costing calculator, seasonal calendar).

4 Research Facilities

Due to the high number of institutions involved in organic farming research – universities, universities of applied sciences, research centres at federal and at county level, private institutes – it is impossible to list all facilities available to organic farming research. Below is a selection of major facilities.

4.1 Experimental farms

Most German Universities involved in research concerning organic farming have experimental stations or farms connected to the relevant institutes. Furthermore, there are experimental farms run by federal institutions like the FAL (Trenthorst) or private ones run by associations like Demeter (Dottenfelder Hof). The table 5 gives an overview about their location and available online context.

Table 5: Organic experimental farms in Germany

Experimental Farms	Location	Online
Gladbacher Hof, Uni Giessen	Villmar	http://www.uni-giessen.de/tbe/home_gh.htm
Hessische Staatsdomäne Frankenhausen, Uni Kassel Witzenhausen	Frankenhausen	http://www.wiz.uni-kassel.de/dfh/index.html
Kleinhohenheim, Uni Hohenheim	Hohenheim	http://www.uni-hohenheim.de/i3v/00065700/08765041.PDF
Institut für ökologischen Landbau, FAL	Trenthorst	http://www.oel.fal.de/
Wiesengut, Uni Bonn	Hennef, Bonn	http://www.iol.uni-bonn.de/indexneu.htm
Dottenfelder Hof	Bad Vilbel	http://www.dottenfelderhof.de/
Klostergut Wiebrechtshausen	Northeim	http://www.kws.de/ca/bv/begh/
Waldhof, FH Osnabrück	Wallenhorst-Lechtingen	http://www.al.fh-osnabrueck.de/1608.html
Lindhof, Uni Kiel	Noer	http://www.agrar.uni-kiel.de/forschung/versuchsgueter/versuchsbetriebe.html

4.2 Demonstration farms

A network of demonstration farms is funded under the Federal Organic Farming Scheme[53].

A network of organic pilot farms is existing in Northrhine-Westphalia for more than ten years now and it is run jointly by the Institute of Organic Farming of the University of Bonn (IOL) and the chambers of agriculture in that federal state. [54]

4.3 Long-term trials

At the Institute of Biodynamic Research in Darmstadt a long-term fertilisation trial has been running since 1980. [55]

5 Initiation of research and stakeholder engagement

Currently the BÖL is the main funding source for research in Organic Food and Farming in Germany. Therefore, the initiation of research and stakeholder engagement within the several phases of the BÖL research programme is described hereafter.

5.1 1st Phase of BÖL (2002 – 2003)

After the decision to establish the Federal Organic Farming Scheme (BÖL), the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) has developed a "Programme to Support Research and Development Projects and Measures for the Transfer of Technology and Knowledge

[53] Netzwerk Demonstrationsbetriebe; demonstrationsbetriebe.oekolandbau.de/

[54] Leitbetriebe Ökologischer Landbau in NRW, http://www.oekolandbau.nrw.de/leitbetriebe/projekt/index.html

[55] Langzeit-Düngungsversuch; www.ibdf.de/v1

in the Organic Farming Sector“ on the basis of the proposals submitted by the project team, which was responsible to carry out the BÖL-concept.

On the basis of topic recommendations by the BÖL-project team mentioned above and in collaboration with the simultaneously established Office of the BÖL within the Federal Agency for Agriculture and Food (BLE), the BMELV prepared an extensive request for proposals covering nearly all fields of Organic Food and Farming. This request was published in 2002 and over 700 short proposals were handed in thereafter. The cardinal procedure of selecting and deciding is shown in chapter 6.

5.2 2nd Phase of BÖL (2004 – 2007/2008)

However, a lot of research challenges and questions could not constructively be solved in the course of a two-year programme. For this reason, it was decided to continue the “Programme to Support Research & Development Projects and Measures for the Transfer of Technology and Knowledge in the Organic Farming Sector“ within the BÖL for a period of more than two years and – together with other parts of the BÖL - up to 2007/2008.

After this decision was taken, the team in charge of the research management within the Office of the BÖL started a broadly spread process to identify the most relevant future research topics. This was organised as a participative process to involve the main stakeholders (scientists, extensionists, practicioners, representatives from associations etc.), as much as possible. The stakeholder involvement took place at workshops, consultings during scientific congresses or meetings following invitations to hand in written suggestions. It was very important to identify the main research deficits and gaps on behalf of the improvement of the whole organic food chain from agricultural production to the consumer demands. Furthermore, this procedure was very important to integrate practical partners with their specific farming experience.

This participative procedure was a challenging task for the responsible research management team. Although Germany is a big European country, the organic farming community is more or less small, compared to other stakeholder communities. Many players of the organic scene were already involved in the BÖL in very different functions. Some of them already worked in running projects, others had received rejections of proposals handed in in the past and some were also involved as external experts to evaluate applications. It was a challenge for the staff of the BÖL to successfully overcome this potential conflict of interests. This topic identifying procedure resulted in requests for proposals concerning the following categories:

- Animal breeding
- Animal feeding
- Animal welfare
- Horticulture
- Food processing
- Food quality
- Concepts for the Food Service Sector
- Socio-economics and marketing
- Plant production
- Plant breeding

After publishing these requests for proposals, more than 800 short proposals were handed in and had to be evaluated as well as rated in a short time (see chapter 6 about the selection procedure).

On behalf of setting the right research priorities and supporting the best project ideas, it is important for the research management team in the BÖL to avoid working and deciding in an “ivory tower“. Hence, the attendance at scientific conferences and workshops, the contact to

several stakeholders (practicioners, extensionists, researchers etc.) outside of the "daily" collaboration on specific projects and personal discussions are "soft", but fruitful sources of input, in order to continue working along the objective requirements.

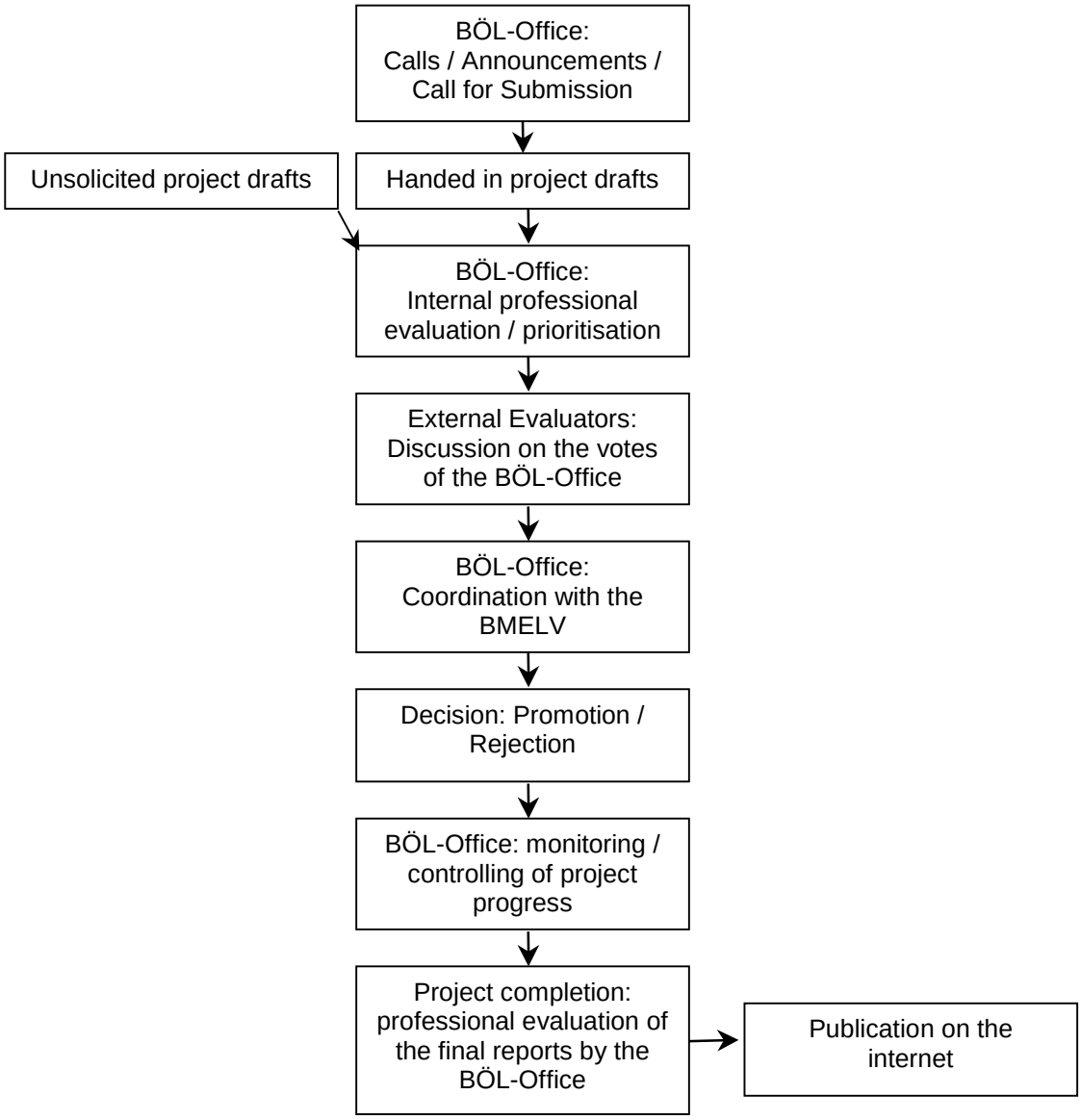
6 Selection criteria and evaluation procedures

Currently, the BÖL is the main funding source for research in Organic Food and Farming in Germany. That's why in the following the selection and evaluation procedure within this research programme is described.

After the announcement of project calls, the staff of the Office of the BÖL (belonging to the Federal Agency for Agriculture and Food - BLE) receives the short proposals. The team, responsible for the research management, evaluates and rates these short applications. Due to the high number of proposals handed in (e.g. approx. 700 short proposals in 2002, approx. 680 short proposals in 2003) the staff, in a first step, uses a "Rating sheet" to apply a common and fair standard to all project proposals. In a second step, the staff of the Office of the BÖL consults their own votes with external experts. This can be done as a confidential workshop at the BÖL-office or by soliciting the experts statements in writing.

For the evaluation of the short proposals the external experts normally use the same "Rating sheet" as the staff of the BÖL-Office. After consultation with the external experts, the Office of the BÖL formulates recommendations clarifying, which applicants of the short proposals should hand in a detailed project proposal_and, which short proposals should be rejected. These suggestions are discussed with the Federal Ministry for Consumer Protection, Food and Agriculture (BMELV). After this decision procedure with the BMELV, the Office of the BÖL solicites detailed proposals, evaluates them and makes a final decision about granting the project in collaboration with the BMELV.

Running projects are permanently monitored by the BÖL-Office staff. This monitoring consists of a professional check of the project progress (e.g. compliance with agreed milestones) and in controlling the correct use of granted funding subsidies. The main tools for the monitoring are interim reports, the final report and annual financial reports. After evaluating the project results, the Office of the BÖL publishes final reports in the German „research platform" (research site of the internet portal www.oekolandbau.de) and in the database Organic Eprints. The following chart shows the selection and evaluation procedure of the research programme within BÖL:



Graph 2: Evaluation procedure

7 Utilisation and communication of research

7.1 Activities under the Federal Organic Farming Scheme

7.1.1 Networks

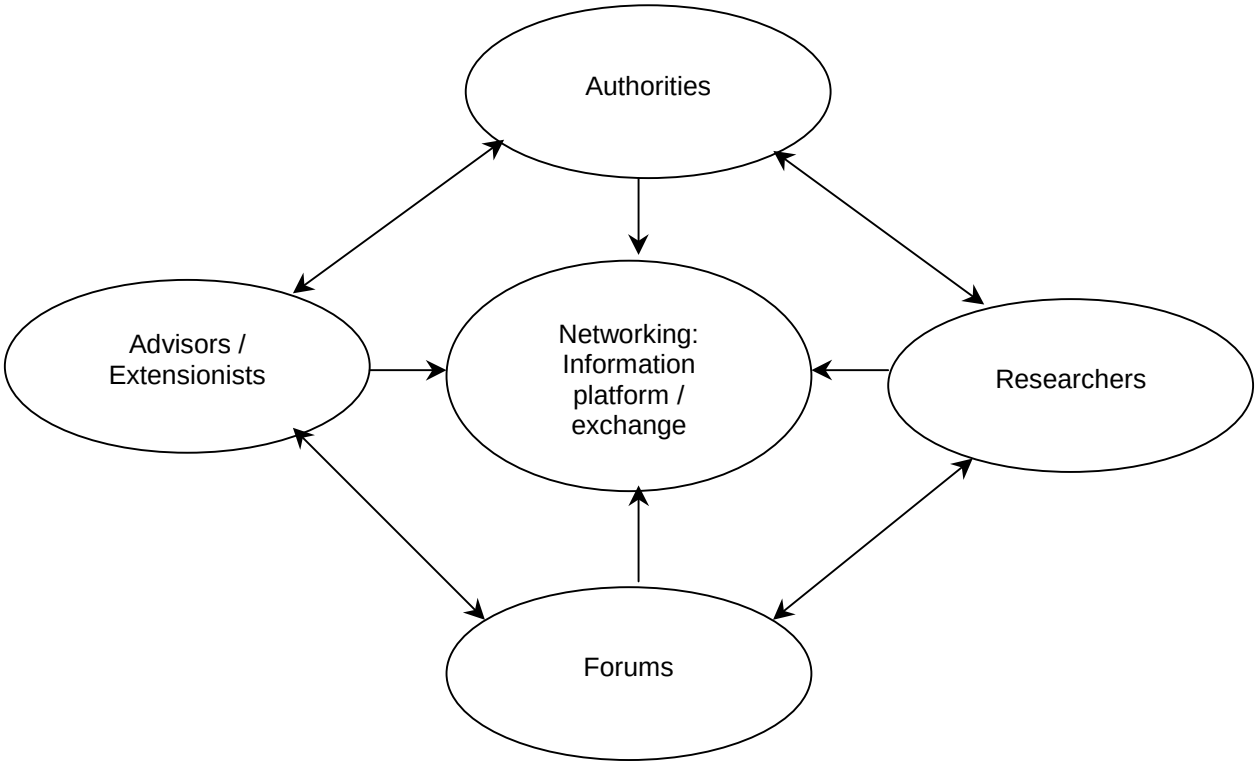
Under the Federal Organic Farming Scheme several networks have been established that meet regularly. These networks unite researchers, research managers, advisors and practitioners to discuss current themes, identify research needs and help implement research results from the Federal Organic Farming Scheme into agricultural practice.

Currently the following networks are funded:

- Forum Plant Protection in Organic Agriculture
- Network Animal Breeding in Organic Agriculture
- Network for the Trial of Organic Medicinal and Herbal Plant Cultivation
- Network for the Advancement of Cultivation Concepts in Organic Agriculture

- Network Food Processing and Food Quality
- Communication Network Organic Meat and Organic Wheat
- Network in Organic Vegetable Cultivation
- Feed Cultivation and Animal Nutrition in Organic Agriculture
- Transnational Network for Organic Animal Breeding – Cooperation between Germany and Poland

Graph 3: Network system and utilisation of research under the Federal Organic Farming Scheme



7.1.2 Communicating the results of BÖL among the research and expert community

The research results are communicated via the research platform of the central internet portal "forschung.oekolandbau.de". This platform, funded under the Federal Organic Farming Scheme, informs with brief texts about new results and it provides access to the full reports. They are all archived at Organic Eprints, where they are publicly accessible. Furthermore, this site informs about relevant events, has an address database and links to internet sites of relevance to the project. The platform maintains a monthly e-mail newsletter to which almost a thousand users have subscribed.

During the first project phase of the research platform project (2002-2003)[56], it was decided to use Organic Eprints for documenting the final reports of the Federal Organic Farming Scheme. During this phase, the German language version of the archive was implemented.

Additionally, a dedicated journalist employed by the Federal Agency for Food and Agriculture (BLE) is in charge of communicating the research results to the organic sector and general public by actively communicating with the media.

7.1.3 Making BÖL results available for agricultural practice

Apart from the networks mentioned above, which play a major role for the dissemination of BÖL research results into agricultural practice, a number of further activities take place, such as:

- As part of several BÖL projects, attractive leaflets for farmers have been published containing the relevant information for agricultural practice [57]
- Results from projects that are relevant for agricultural practice are processed and adapted to the needs of farmers and presented at the central internet portal for organic farming of the Federal Ministry www.oekolandbau.de [58]

For the next period of the research programme under the Federal Organic Farming Scheme even greater attention will be given to knowledge transfer.

7.2 Research conferences on organic agriculture in the German-speaking region[59]

Since the early nineties, the Foundation Ecology & Agriculture (SÖL) has been coordinating a series of scientific research conferences on organic agriculture. Each conference is organised in cooperation with a university or research institute active in organic research. These conferences provide an opportunity for researchers from Germany, Austria, Switzerland and other European countries to present their activities and results. Scientists, students, farmers, as well as members of scientific and agricultural institutions are invited to attend the conferences. The next conference will be held in March 2007 in Stuttgart-Hohenheim.

The 8th research conference was held at the University of Kassel. It was organised from the Faculty of Organic Agricultural Sciences (Fachbereich Ökologische Agrarwissenschaften) of the University of Kassel, the Institute for Organic Farming (Institut für Ökologischen Landbau), the Federal Agricultural Research Centre (Bundesforschungsanstalt für Landwirtschaft - FAL) and the Foundation Ecology & Agriculture (SÖL).

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[56] http://orgprints.org/580/

[57] For instance there is a leaflet on thistle control, available at http://orgprints.org/5015/02/5015-02OE055-2-bba-verschwele-2003-distel-faltblatt.pdf. A leaflet on propagation material is available at https://www.fibl.org/shop/pdf/mb-1367-pflanzsubstrate.pdf.

[58] For example http://www.oekolandbau.de/erzeuger/tierische-erzeugung/milchviehhaltung/aus-der-forschung/entwicklung-eines-konzepts-zur-schwachstellenanalyse-in-milchviehhaltenden-betrieben/

[59] Wissenschaftstagung zum ökologischen Landbau http://www.soel.de/english/wissenschaftstagung_e.html

For the first time ever, the Organic Eprints Archive was used for submitting the conference papers. After the conference, these papers (more than 200) were made available publicly[60]. Together with the final reports of the Federal Organic Farming Scheme, Organic Eprints now gives an almost complete overview of current organic farming research in Germany.

7.3 Implementation of practical research results at laender level

At many research stations of the federal states a lot of research targeting the needs of agricultural practice is carried out, much of this is funded under the Federal Organic Farming Scheme. In most cases, there is a close link with the organic advisory service, which guarantees that the research is oriented at the needs of practice and that the results are transferred to the farmers. The results of these trials are also documented in the Organic Eprints Archive[61].

8 Scientific education & research schools

All German universities and universities of applied sciences with a chair / coordinator for organic farming offer organic farming courses (see list above). Also most other faculties of agriculture or environmental studies are involved in research and teaching and offer courses about organic farming or agroecology.

There are also some Bachelor and Master Courses specialising in Organic Farming (see list below).

- BSc Studiengang Ökolandbau und Vermarktung / BSc Organic Farming and Marketing, Fachhochschule Eberswalde, Fachbereich Landschaftsnutzung und Naturschutz, 16225, Germany, http://www.fh-eberswalde.de/oelbv/index.htm
- BSc Ökologische Landwirtschaft / Organic Farming, University of Kassel; Fachbereich Ökologische Agrarwissenschaften, 37213 Witzenhausen, Germany, http://www.uni-kassel.de/fb11cms/?c=217
- Common European Specialisation in Ecological Agriculture, c/o Fachgebiet Ökologische Land- und Pflanzenbausysteme, 37213 Witzenhausen, Germany, http://www.wiz.uni-kassel.de/foel/sokrates.html ¨
- MSc Ökologische Landwirtschaft / Organic Farming, University of Kassel; Fachbereich Ökologische Agrarwissenschaften, 37213 Witzenhausen, Germany, http://www.uni-kassel.de/fb11cms/?c=217
- Master Programme (MSc) Organic Food Chain Management, University of Hohenheim / Universität Hohenheim (340D), 70593 Stuttgart, Germany, http://www.uni-hohenheim.de/organicfood/
- MSc International Ecological Agriculture, University of Kassel; Fachbereich Ökologische Agrarwissenschaften, 37213 Witzenhausen, Germany, http://www.uni-kassel.de/fb11cms/?c=35

Under the Federal Organic Farming Scheme, a trainee programme for graduate students is offered and the participants are trained to work in the organic sector, be it in advice, trading companies or with publishers[62].

Furthermore most organic producer and other sector organisations as well as some agricultural schools provide training on organic farming. At the central internet portal on organic farming (http://www.oekolandbau.de/service/termine/) all events including short training are listed.

[60] http://orgprints.org/view/projects/wissenschaftstagung-2005.html

[61] http://orgprints.org/view/projects/de-agrarverwaltung.html

[62] Projekt "Traineeprogramm Öko-Landbau", Ausbildung in der Öko-Beratung, Kontrolle, Verarbeitung und Vermarktung, http://www.soel.de/projekte/trainees.html

Table 6: Research schools with faculties for organic agriculture or trainee programmes

Institution	Course	Online
University of Bonn Prof. Köpke	Complete programme of study	http://www.iol.uni-bonn.de/
University of Giessen Prof. Dr. G. Leithold	Complete programme of study	http://www.uni-giessen.de/orglandbau/
University of Hohenheim Dr. Sabine Zikeli	Organic Food Chain Management	http://www.uni-hohenheim.de/organicfood/
University of Kassel-Witzenhausen Prof. Dr. J. Heß	Complete programme of study	http://www.wiz.uni-kassel.de/foel/
University of Kiel Hans-Rudolf Bork	Kiel Ecology-Centre	http://www.ecology.uni-kiel.de/ecology/english/index.html
University of Goettingen Prof. Dr. Teja Tscharntke	Agroecology	http://wwwuser.gwdg.de/~uaoe/Agroecology.html
Hochschule für Technik und Wirtschaft Dresden Prof. Dr. Knut Schmidtke	Course of study	http://www.htw-dresden.de/pillnitz/zzz_endkntn/fb/prof_mit.html#KSchmidtke
SOEL Britta Weitbrecht	Trainee programme for extension service	http://www.soel.de/soel/pm/2003/06_18.html
Bauernschule Hohenlohe	Seminars, training, courses	
Fachschule für ökologischen Landbau	Training in organic agriculture	http://www.riswick.de/oeka/oe_fachschule.shtm
University of Applied Sciences Eberswalde Prof. Dr. Hans-Peter Piorr	Complete programme of study	http://www.fh-eberswalde.de/oelbv/
Sächsische Interessengemeinschaft Ökologischer Landbau e. V. (SIGÖL) Roland Einsiedel	Training and courses in organic agriculture in the federal state of Saxonia	sigoel@web.de
Verband für handwerkliche Milchverarbeitung im ökologischen Landbau	Seminars, information for organic cheese producers and milk processing	http://www.milchhandwerk.info
University of Applied Science Nuertingen Prof. Dr. Barbara Elers	Research and teaching	http://www.fh-nuertingen.de/profhp/elers/

References

Gerlach, Florian; Meier, Julia und Willer, Helga (2005): Kommunikation von Forschungsergebnissen deutschlandweit und international: forschung.oekolandbau.de und orgprints.org [Communication of research results via orgprints.org and forschung.oekolandbau.de]. Poster presented at the 8. Wissenschaftstagung Ökologischer Landbau – Ende der Nische, Kassel, 01.03.2005 - 04.03.2005; Veröffentlicht in Heß, J und Rahmann, G, (Hrsg.) *Ende der Nische, Beiträge zur 8. Wissenschaftstagung Ökologischer Landbau*. http://orgprints.org/3668/

Heß, Jürgen und Rahmann, Gerold, (Hrsg.) (2005): Ende der Nische - Beiträge zur 8. Wissenschaftstagung Ökologischer Landbau. Tagungsband 8. Wissenschaftstagung Ökologischer Landbau - Ende der Nische, Kassel, 01.03.2005 - 04.03.2005. kassel university press GmbH, Kassel. http://orgprints.org/4541/

Heß, Jürgen und Schüler, Christian (2003): Ökoforschung am Standort Witzenhausen. *Ökologie & Landbau, Jahrbuch Öko-Landbau 2003* 125(1/2003):pp. 72-74. http://orgprints.org/955/

Rahmann, Gerold und Flachowsky, Gerhard (2003): Forschung für den Ökolandbau in der FAL [Research in Organic Agriculture in the German Federal Agricultural Research Centre (FAL)], in Rahmann, Gerold und Nieberg, Hiltrud, (Hrsg.) *Ressortforschung für den ökologischen Landbau 2002*. Landbauforschung Völkenrode Sonderheft Nr. 259, Seite(n) pp. 88-92. Institut für ökologischen Landbau (OEL) und Institut für Betriebswirtschaft, Agrarstruktur und ländliche Räume (BAL), Bundesforschungsanstalt für Landwirtschaft (FAL). http://orgprints.org/2128/

Rahmann, Gerold, (Hrsg.) (2006): Tagungsreader: Statusseminar "Das Neuste aus der Ressortforschung für den Ökologischen Landbau 2006" [Proceedings of the Seminar: "Recent results of state funded research on organic farming 2006"]. Tagungsband Statusseminar der Ressortforschungseinrichtungen des BMVEL, Braunschweig, 02.03.2006. Senatsarbeitsgruppe Ökologischer Landbau. http://orgprints.org/7683/

Willer, Helga; Meier, Julia und Gerlach, Florian (2005): Öko-Landbau-Forschung in Deutschland [Organic Farming Research in Germany]. *Ökologie & Landbau* 1/2005(133):pp. 52-55. http://orgprints.org/4233/

CORE Organic Defra-UK Country Report

CORE Organic report from Defra

PREPARED BY:

THE DEPARTMENT OF ENVIRONMENT,
FOOD AND RURAL AFFAIRS (DEFRA, UK)

Content

This report was provided by Defra to support the work of the partners to the Core Organic ERANET. Its focus is the Defra Organic Farming and Food R&D programme. Other public bodies in England and Wales can support R&D relevant to the organic sector. In addition, the developed administrations in Scotland and Northern Ireland support some relevant R&D within wider R&D programmes. Therefore this report should not be regarded as a complete account of all UK R&D relevant to the organic sector.

1 History

Until the mid 1980s, organic farming R&D in the UK was led by the private sector, notably the Soil Association (founded in 1946), the Henry Doubleday Research Association (HDRA, founded in 1954) and the Elm Farm Research Centre (EFRC, founded in 1981).

In 1985/86 the Ministry of Agriculture Fisheries and Food (MAFF, now DEFRA- The Department for Food, Environment and Rural Affairs) commissioned a report on the development of the organic sector. This resulted in the establishment of UKROFS (UK Register of Organic Food Standards) an executive non-departmental public body. ACOS (The Advisory Committee on Organic Standards) superseded UKROFS and advises Ministers on matters related to organic standards. A sub-committee of ACOS provides advice to Defra on organic R&D issues and priorities.

Since 1991, MAFF and now Defra has funded an organic farming research and development programme to support the development and delivery of Government policies on organic farming. Over the last decade, expenditure on organic farming R&D in this dedicated Defra programme has increased and currently stands at around 3 million Euros per annum (see finances below).

In 2002, the Action Plan to Develop Organic Food and Farming in England was published by Defra in response to the report of the Policy Commission on sustainable farming and food led by Sir Don Curry, which recommended the development of a strategy for organic food production addressing all parts of the food chain. The Plan was reviewed by the Organic Action Plan Group and a review document Action Plan to Develop Organic Food and Farming in England - Two Years On was published in August 2004.

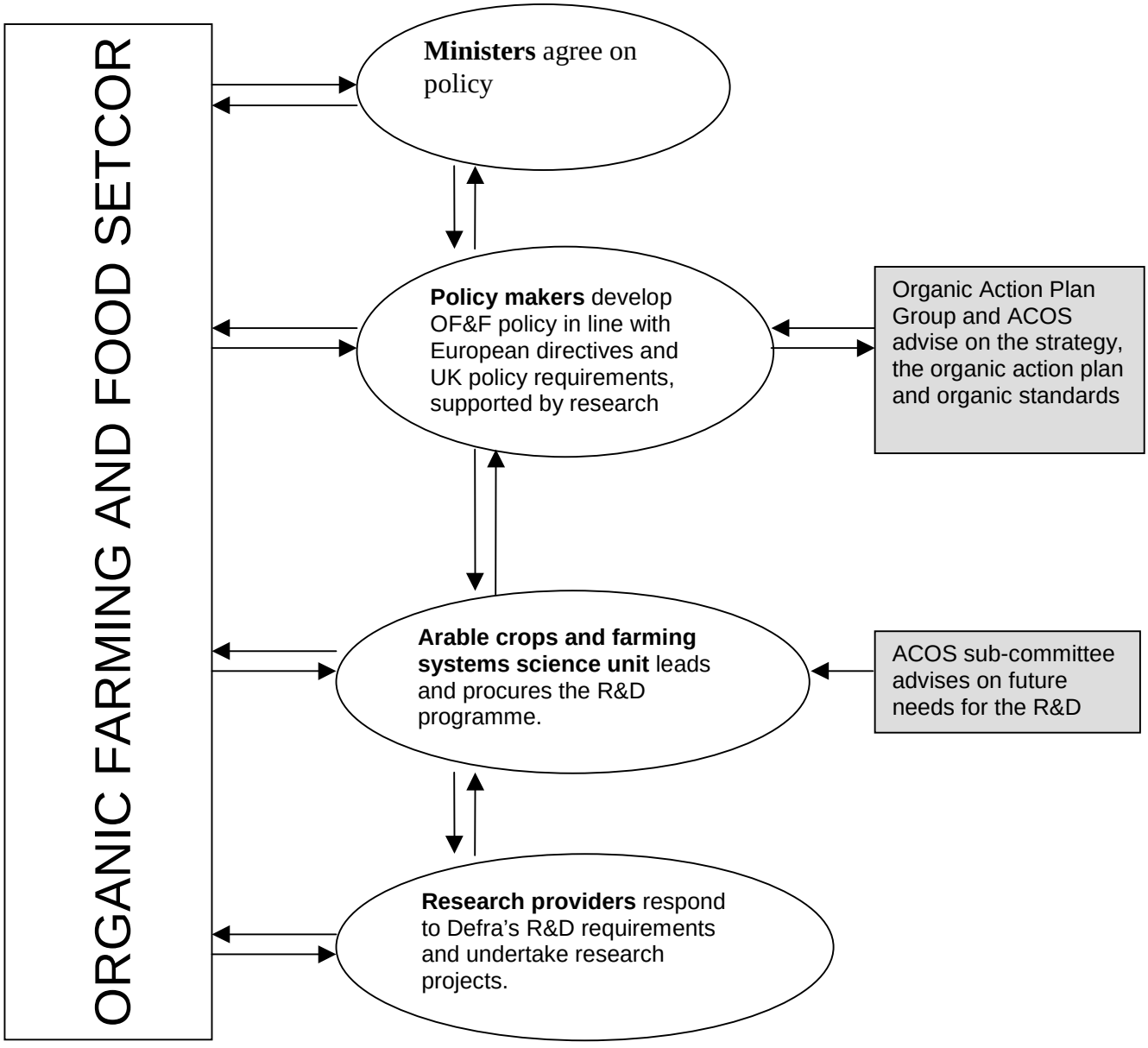
The strategic objective of the Defra R&D programme is to inform the development of its policies and to further the development of the sector in line with the public goods that the sector protects and enhances. Specific scientific objectives drive research on the methods, costs and benefits of conversion; identifying sound methods of production and processing, identifying and overcoming the main barriers to commercial organic production; environmental impact of organic farming; other issues relevant to the organic sector.

The aim of the programme is to deliver knowledge to improve organic farming methods and the performance of the organic sector. It also provides scientific evidence for policy makers and aids delivery of the organic action plan. Research undertaken includes assessment of agronomic and economic performance, investigations into technical barriers to production and appraisal of the impact of organic farming on the environment. The research supports policy development and decision-making, and helps inform those considering conversion to organic methods and those already using such methods.

2 Organisation

Defra spends about 3 Million Euros per year on organic farming research. Defra plans, commissions and manages the R&D programme itself.

Figure 1: The Defra Organic Farming and Food R&D programme organisational chart



The main policy outcomes supported through Defra's investment in organic farming R&D are:

- A sound evidence base to support the assessment of organic farming's potential to further sustainable development;
- Sound production techniques, and performance and cost information on which to base sound policy and producer decisions.
- A sound evidence base on which to base policy decisions including decisions on proposals for developing EU organic standards.

Arising from these, the key current scientific objectives of the Defra organic farming R&D programme are:

- To provide information on agronomic performance and profitability/costs of the main types of organic farm system, during and after the conversion process (work is being undertaken on the following systems: stockless arable, upland sheep and beef, specialist dairy and field vegetable).
- To quantify and evaluate the impact of organic farming on the environment taking into account such externalities as pollution and the cost of dealing with such pollution as well as the effects on wildlife and landscape quality.
- To identify and develop improved techniques of organic production, in particular to overcome any key technical constraints. General areas for study include: optimising crop nutrient supply; methods of weed and pest/disease control; evaluation of the various inputs used (e.g. crop varieties, nutrient sources, animal breeds); and animal health and welfare practices.
- To evaluate and develop proposals for changes and additions to organic standards.

Organic farming research in the UK is carried out largely by three types of organisations:

- Private research institutes and organisations
- Universities
- Research Council affiliated research institutes

Other UK Public funding bodies are:

- Scottish Executive Environmental and Rural Affair's Department (SEERAD)
- Northern Ireland: Department of Agriculture and Rural Affairs (DARD)
- Research Councils
- Food Standards Agency
- The Environment Agency
- The Welsh Assembly Government (WAG)

3 Mapping of Research programmes and subjects covered

Defra funds an organic farming programme with an annual budget of € 3 million through projects procured by Defra or sponsored through LINK programmes. As part of the Organic Action Plan, the UK Government committed up to 7.35 million Euros over five years for LINK research on Organic Farming, from 2003/04. LINK is a UK government wide mechanism that enables partnerships between the private sector and academia to gain government financial sponsorship for their own research. Besides commercial organisations, any non-governmental organisation drawing on private sector funds qualifies as a private sector partner. Other public bodies that fund organic research are mainly the devolved administrations (SEERAD, DARD), the Research Councils (BBSRC, NERC, ESRC and their joint RELU programme).

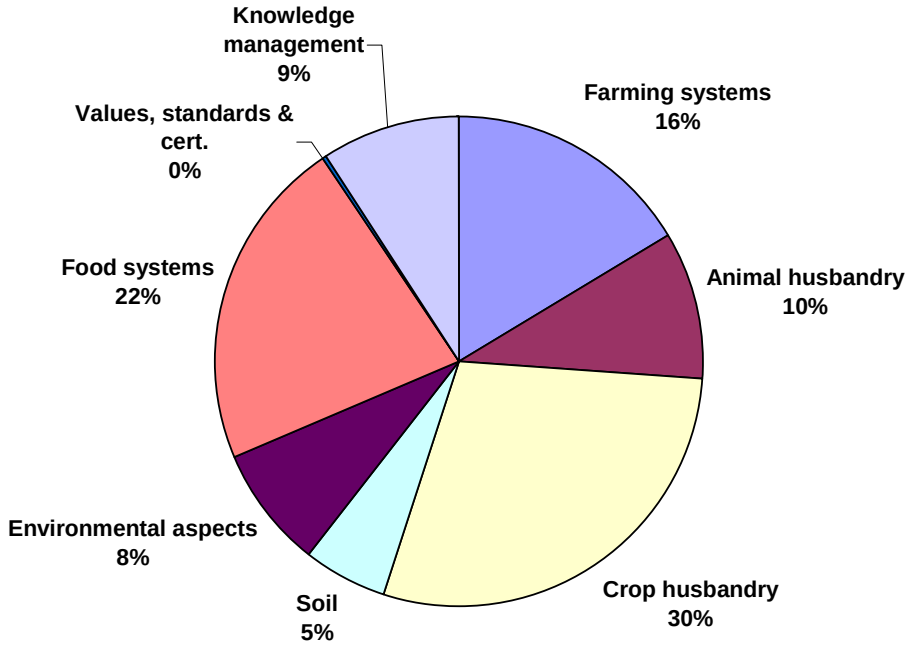
Since the creation of the programme, the research projects commissioned by Defra have covered all areas of the organic R&D sector, including:

- Crop protection, nutrition, production, management and breeding (approximately 65 projects).
- Livestock production, nutrition, health and welfare (approximately 30 projects).
- Farm systems, benchmarking, economy and reviews of the sector (more than 35 projects).
- The environment (9 projects).

Table 1: UK publicly-funded Organic farming research projects between 2000 and 2005

			Total in 1,000 €
1	***Farming systems***		**4,871**
	Defra		2,286
	Other	SEERAD, WAG	2,585
2	***Animal husbandry***		**2,903**
	Defra		2,760
	Other	SEERAD, WAG, BBSRC	143
3	***Crop husbandry***		**8,595**
	Defra		5,598
	Other	SEERAD, WAG, DARD, Research Councils	2,997
4	***Soil***		***1,597***
	Defra		931
	Other	SEERAD	666
5	***Environmental aspects***		**2,401**
	Defra		260
	Other	RELU, WAG, English Nature	2,141
6	***Food systems***		***6,528***
	Defra		1,686
	Other	SEERAD, BBSRC, ESRC, Research Councils	4,842
7	***Values, standards & cert.***		**140**
	Defra		140
	Other		
8	***Knowledge management***		**2,686**
	Defra		1,044
	Other	WAG, Research Councils	1,642
	TOTAL	**Overall**	**29,721**
		Defra	14,706
		Other	15,015

Figure 2 illustrates the total of UK public research spending by subject category between 2000 and 2005

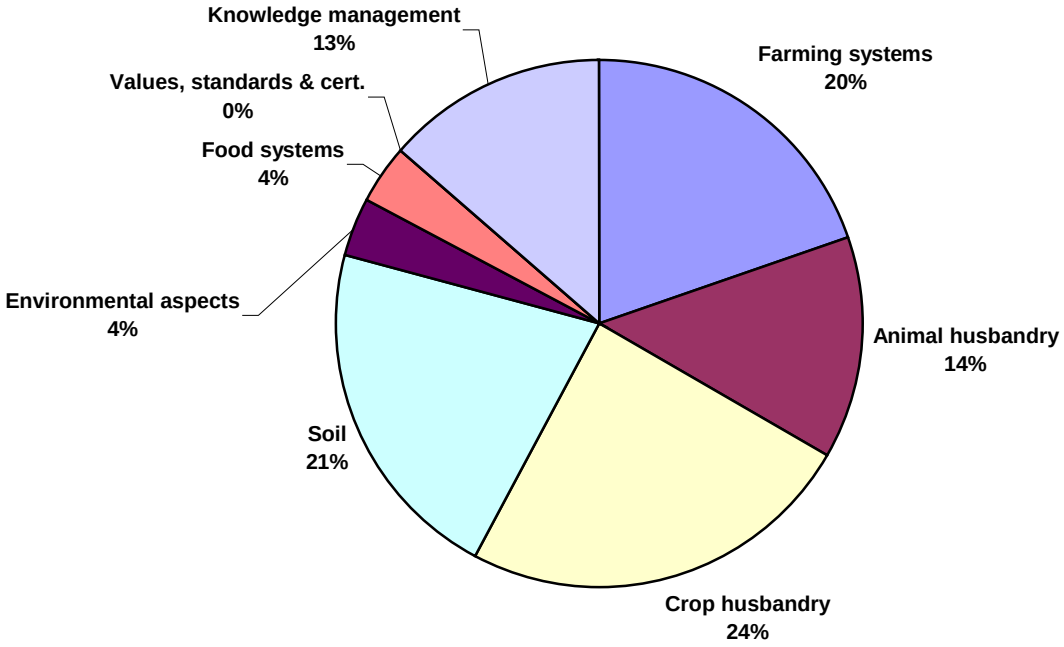


The Defra budget spending per subject varies between years and depends on the size of each project and previous results. The actual spending per subject for 2005-06 is summarised in table 2 and figure 3.

Table 2: current expenditures per category for the financial year 2005/06

	Total in 1,000 €
Farming systems	558
Animal husbandry	386
Crop husbandry	693
Soil	603
Environmental aspects	101
Food systems	109
Values, standards & cert.	
Knowledge management	382

Figure 3: current expenditure per category for the financial year 2005/06



4 Financing

Defra represents the major public funder in the R&D for the organic farming and food sector. Since 2000, the Defra's budget per annum has remained about 3 million Euros.

Table 1 provides a summary of the public funding for organic farming and food related projects starting between 2000 and 2005, categorised according to the 8 main subject areas of organic eprints. Defra provides a total funding of € 14.7 million during the period (equivalent to approximately € 2.9 per year) and € 15 million is funded by other UK public bodies (equivalent to € 3 million per year).

5 Research facilities

The main research facilities in organic farming and food available in UK are detailed in table 3.

Table 3 UK main research facilities

Type	Organisation	Location	Details
Farm	EFRC	S and E England	Commercial livestock and arable farm, dedicated arable research farm at and use of facilities for livestock, arable and environmental research.
Access to commercial farms	EFRC	England	Arable, livestock and horticultural farms
Experimental farm/ long term field experiment	ADAS Terrington	E England	Rotation trial within a stockless system
Experimental farm	ADAS Redesdale	NE England	Upland Beef & sheep flocks, systems comparisons
Experimental farm	ADAS Pwllpeiran	Wales	Upland Beef & sheep flock, semi-natural habitats
Experimental farm	ADAS Gleadthorpe		Poultry unit
Experimental farm	IGER Trawsgoed	Wales	Organic dairy farm, comparison of different production strategies
R&D farm	University of Wales	Wales	Beef & sheep, Currently mainly commercial activities
R&D farm	Newcastle University	NE England	Mixed farm including dairy, feeding trials
R&D farm	Scottish Agricultural College	Scotland	General
R&D farm	Duchy College	Cornwall	Arable farm, crop trials
Experimental fields Modelling	HDRA		Field scale vegetable monitoring R&D farm network N-models in organic rotations
Experimental fields	NIAB		Variety trials
Modelling	Veterinary Epidemiology and Economics Research Unit		Herd data
General	Bristol University		Monitoring protocol for farm animal health and welfare
Laboratory services	Central Science Laboratory		Food quality
Model	Institute of Rural Science	Wales	Modelling financial impact of conversion/organic management (OrgPlan/OCIS models)

6 Initiation of research and stakeholder engagement

In the UK, the definition of needs and priorities for research in organic food and farming has been pursued initially by organic organisations and subsequently by government.

The Defra R&D programme is planned and procured to support the development and delivery of public policy.

The programme is reviewed every 3 – 4 years by a panel of external experts. As a result, the R&D programme is amended according to future needs and priorities. Defra receives ongoing expert advice in setting and reviewing research priorities for the organic sector through the R&D sub-committee of the Advisory Committee on Organic Standards (ACOS), which was established as a result of the Action Plan and replaces the previous UKROFS.

To assist the ACOS R&D sub-committee in providing advice, Defra carried out a wide consultation on priorities for research needed with relevance to the development of the organic sector in line with the Organic Action Plans for England, Wales and Scotland and Organic Farming in Northern Ireland. The consultation exercise aimed to identify and analyse issues and aspirations that stakeholders feel should be addressed by publicly funded organic farming research in the UK.

Stakeholders included the continuum of the organic sector; farmers, producers, land managers, processors, marketers, retailers, consumers and the scientific community.

The consultation built on past work carried out in England, Scotland and Wales. It has updated the information on past research projects and funding. The database has also been expanded to include information on processing, marketing and food quality and safety of organic products. The study has identified and collated past research priorities; produced a directory of past and current projects and evaluated these projects against the collated priorities. The findings will be discussed by the ACOS R&D sub-committee, which will develop recommendations to Defra in relation to research priorities of future organic farming research.

Administrations in Scotland and Wales have also developed their own specific priorities:

Scotland (http://www.scotland.gov.uk/Publications/2005/05/13154117/41188),

Wales (http://www.organic.aber.ac.uk/research/ukrofs/index.asp)

7 Selection criteria and evaluation

Defra uses several research investment methods: open competition, single tender, negotiation with established contractors under umbrella contracts, and LINK. Each of these investment or procurement routes follows guidelines to ensure good value for money, the greatest chance of success and to sustain an effective provider base. For large projects, a peer review of project proposals is used. This evaluation covers the quality of the science involved, the relevance of the subject, the reliability of the anticipated results and their importance and use by the appropriate stakeholders.

Each project accepted is monitored by and subject to Defra intervention if the project outcome or delivery is at risk. For projects longer than a year an annual report is required describing the progress of the study and the accomplishment of the milestones for this time.

At the end of each project, a final report has to be submitted. The science unit supported by scientific advisers and where appropriate external peer review make an assessment of the report. The reliability of the results and the quality of the report are assessed. All final reports are published via Defra's website.

8 Utilisation of research

The results of organic research are utilised by a range of stakeholders including farmers, food processors, marketing organizations, advisory services, researchers, educationalists and policy organisations. All project reports are published by Defra and the dissemination and communication of research results is undertaken by a variety of organisations and by the researchers themselves. All Defra funded projects require publication (other than Defra's publication of the final report), usually through journals, conferences and workshops. Table 4 summarises the target groups and means of dissemination in addition to that provided by the researchers themselves.

Currently Defra is funding a project that will facilitate the transfer of the results of all Defra organic research to advisers and trainers operating in the field of organic farming. Defra encourages also the publication of its final reports in the European common database created through the ERANET project CORE-Organic.

Table 4: Research dissemination activities in the UK

	EFRC OAS	**HDRA**	**OCW**	**SA**	**IOTA**	**IGER**	**Duchy Col.**	**RG**	**OC**	**OMO**
Target										
Farmers	**	**	**	**		**	**	**	**	**
Advisers	**	*	**	*	**	*				*
Policy	**	**	**	**			*	*		
Type										
Farm advice	**		**					*	**	**
Training & seminars	**	**	**	**	**	**	**	**	**	**
Leaflets		*	*	**	**	*				**
Journals	**	**	**	**			**			**
Internet	**	**	**	**	**	**	*	*		*

Key: EFRC/OAS: Elm Farm Research Center, Organic Advisory Service
HDRA: Henry Doubleday Research Association
OCW: Organic Center Wales
SA: Soil Association
IOTA: Institute of Organic Training and Advice
IGER: Institute of Grassland and Environmental Research
Duchy Col: Duchy College
RG: Regional organic groups
OC: Independent organic consultants
OMO: organic marketing organizations

Estimated level of intensity: ** High, * Medium

9 Scientific education and research schools

University teaching organic agriculture at BSc. and post graduate level

Institute of Rural Sciences
University of Wales, Aberystwyth
Ceredigion, SY23 3AL
Tel: 01970 621614 Fax: 01970 611264
E-Mail: irs-enquiries@aber.ac.uk
Internet: http://www.irs.aber.ac.uk/brochure/organic.shtml
Course titles: BSc(Hons) Organic Agriculture (f/t)
BSc(Hons) Rural Resources Management (organic options) (f/t)
Higher National Diploma in Agriculture (organic option) (f/t)
Postgraduate Certificate in Organic Agriculture (f/t 1 semester)
Postgraduate Diploma in Organic Agriculture (f/t 2 semesters)

Scottish Agricultural College
Ferguson Building, Craibstone, Bucksburn, Aberdeen, AB21 9YA
Tel: 0800 269453
E-Mail: recruitment@sac.ac.uk
Internet: http://www.sac.ac.uk
Course titles: PgC/PgD/MSc Organic Farming (f/t or p/t by distance learning)
HND in Agriculture (Organic options) (f/t)
Training services for farmers.

University of Newcastle upon Tyne
Newcastle Upon Tyne NE1 7RU
Tel: 0191 222 5594 Fax: 0191 222 8685
E-mail: enquiries@ncl.ac.uk
Internet: http://www.ncl.ac.uk
Course titles: BSc (Hons) Organic Food Production (honours option in BSc Agriculture) (f/t)
Pg/D & MSc Sustainable Land Management and Rural Development (organic option)

London South Bank University
Faculty of Engineering, Science and Built Environment, 103 Borough Road, London SE1 0AA; Tel: 020 7815 7815
E-mail: enquiry@lsbu.ac.uk
Internet: http://www.lsbu.ac.uk/esbe/courses
Course title: BSc (Hons) Organic Food Studies (f/t 3 years or sandwich 4 years)

Royal Agricultural College
Cirencester, Gloucestershire, GL7 6JS
Tel: (01285) 652531 Fax: (01285) 650219
E-Mail: steve.chadd@rac.ac.uk
Internet: http://www.rac.ac.uk
Course title: BSc (Hons) Agriculture (organic agriculture)
Msc Organic Agricultural Systems

Other universities and colleges teaching organic options

Harper Adams University College
Edgemond, Newport, Shropshire TF10 8NB
Tel: (01952) 820280 Fax: (01952) 814783
E-mail: admissions@harper-adams.ac.uk
Website: http://www.harper-adams.ac.uk
Course title: PgC/PgD/MSc Sustainable Agriculture (organic option)

The University of Reading
Whiteknights, P.O. Box 217, Reading, RG6 6AH
Tel: 0118 378 8618/9
Email: sapdstudentoffice@rdg.ac.uk
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FdSc Horticulture (Nursery & Retail) (year 2 organic option) (2 years f/t)

CORE Organic Country Report

Report on Italian Research in Organic Food and Farming (2000–2005)

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Contents

1. History

Introduction

In Italy since the eighties, the scientific community opened a discussion on how to face many agricultural critical points, reconsidering old but renewed approaches to make agriculture more environment and consumer-friendly.

In 1988 the first coordinated project on OF&F (Biological and integrated control of crop and forest pest and disease) was financed by MIPAF, involving 46 research units (research centres and universities).

But it was only in the last decade that interest in organic farming really took off, when production methods continued to develop, along with consumers' keen concern to be supplied with more wholesome, environment-friendly products. There was a major increase in the number of producers, and new initiatives got on the way for processing and marketing organic products.

Italy has become the European country with the largest cultivated surface (954,361 ha, including 246,318 ha under conversion from conventional to organic farming, in 2004). The total surface is mainly cultivated with forage crops and pastures (48 %); the rest is devoted to cereals (20 %), fruit tree, including vineyards and olive-tree (18 %), vegetables and industrial crops (4 %). These data refer to land cultivated under provision of EC Regulation 2092/91 and its modifications.

The gradual recognition of the organic farming potential to create a high added value food market and socio-economic benefits to farmers, producing positive effects on environment, public health, social and rural development and animal welfare as well, has driven the European Union and Italy to adopt specific legislation and promote research actions.

The following different European acts issued after the Council Regulation 2091/92, have all recognized organic farming as a strategic tool to realize a sustainable development of European society: the Council Regulation EC 1257/1999 supporting rural development; the EU Commission Strategy for Sustainable Development in 2001, the Sixth Community Environment Action Programme in 2002 and, finally, the mid-term review of the Common Agricultural Policy in 2003.

The European Action Plan for Organic Food and Farming (OF&F Plan) has been issued in June 2004, strongly supported by Italy during its EU chairing semester (June-December 2003). This document aims "*to assess the situation and to lay down the basis for policy development in the coming years, thereby providing an overall strategic vision for organic farming's contribution to the common agricultural policy (CAP)*". The Commission recognizes the dual key role of OF&F in food market and land management and the importance of research on organic farming and processing methods to exploit this potential *(*Action 7). Therefore, an important part of the country's policies aimed at developing the organic sector has been addressed to strengthen research and training at different levels, adopting specific research programmes and farmers training to ensure the innovation transfer into agricultural practice with close cooperation among researchers, advisory services, farmers and the food production chain.

As other Member States and Regions, Italy has adopted a national Action Plan on OF&F research in 2002. The Action Plan was devoted mainly to the development of organic farming, focusing on agro-environmental programmes, market development, research and production capacity building.

In December 2005, a new National Strategic Plan on OF&F has been approved which does not include specific research priorities, but is a reference framework of actions to strengthen the whole OF&F production chain.

Italian Research on OF&F

Italian National Plan on OF&F research (2002)

Italy adopted its own National Plan on OF research (issued by the Ministry of Agricultural and Forestry Policies, MIPAF) to optimize the use of the resources under a strategic framework programme of actions. In fact, Italian OF&F research has been suffering from a very high and chronic fragmentation considering that other than national institutions, many different public and private bodies locally support OF&F research initiatives, due to the high added value that organic products can represent for some depressed agricultural areas in comparison with the conventional ones.The general OF Plan objective was to establish a national coordination of all research actions by adequate monitoring of ongoing research and evaluation of results and to improve strategies of knowledge and innovation transfer to the organic farming sector, with the cooperation of regional organisations.

The OF Plan promoted: research projects "from farm to fork" involving different stakeholders; the strengthening of the research institutions devoted to OF&F; the coordination of all research initiatives and the knowledge dissemination system.

On the basis of this plan the research should be focused on:

- exploitation of germplasm and biodiversity
- genetic improvement and rescue of old species
- improvement of cultivation techniques
- set up of new processing and marketing technologies
- identification of quality indicators
- strengthening of control systems

In the framework of the OF Plan a national public research call has been issued in 2002 and further voluntary submitted research projects have been funded.

In December 2005 a new general Action Plan on OF&F and a Programme on OF&F were launched by MIPAF, after a large public consultation of stakeholders and the National Consultant Committee of Organic Farming.

The general aim of the new Plan is to enforce and to qualify the agro-food production chains by:

- encouraging the conversion to organic farming
- developing organic animal husbandry also in relation to its fundamental role as source of manure
- strengthening the OF&F internal market
- stressing the OF&F role to support environmental and health policies
- strengthening the use of sustainable energy and materials in coherence with the OF principles
- introducing OF methods also in no-food production to reduce environmental impact and improve people life quality

Some of the foreseen actions are devoted to promote OF&F at international level, creating and enforcing international market, development cooperation networks, as well as research and training.

Consequently, research actions in the next future should mainly be addressed to solving crucial questions to make those objectives concrete and the coordination of the national research system should be a powerful tool to fulfil the OF&F Plan aims.

At the same time, a general revision of the current Italian regulation on OF&F production is in progress and some research needs could rise in the future from this activity too.

2. Organisation

In Italy, Organic Food and Farming research is carried out by many research centres and universities. It does not exist as a single centre devoted exclusively to OF&F research. An overview of the research centres grouped under the reference administrations is as follows:

A) MIPAF - Ministry of Agricultural and Forestry Policies

1. CRA - National Council of Agriculture Research and Experimentation (http://www.entecra.it); most of the MIPAF research centres (30 different institutions) have recently been reorganised under this national research body. CRA has institutional competence on different fields of agricultural research and its structures are strongly involved in OF&F projects.
2. INRAN - National Research Institute for Food and Human Nutrition (http://www.inran.it)
3. INEA - National Institute of Agricultural Economy (http://www.inea.it)
4. ISMEA - Institute for Study of Agricultural Market (http://www.ismea.it)

B) MIUR - Ministry of Education, University and Research

1. Universities: in Italy, there are 23 Faculties of Agriculture, many of them carrying out one or more research projects on OF&F, supported by national or regional authorities:

   Università degli Studi di ANCONA http://www.unian.it
   Università degli Studi di BARI http://www.uniba.it
   Università degli Studi della BASILICATA http://www.unibas.it
   Università degli Studi di BOLOGNA http://www.unibo.it
   Università degli Studi di FIRENZE http://www.unifi.it
   Università Cattolica del Sacro Cuore (PIACENZA) http://www.unicatt.it
   Università degli Studi del MOLISE http://www.unimol.it
   Università degli Studi di NAPOLI "Federico II http://www.unina.it
   Università degli Studi di PADOVA http://www.unipd.it
   Università degli Studi di PALERMO http://www.unipa.it
   Università degli Studi di PERUGIA http://www.unipg.it
   Università di PISA http://www.unipi.it and http://www.agr.unipi.it
   Università degli Studi MEDITERRANEA di REGGIO CALABRIA http://www.unirc.it
   Università degli Studi di TORINO http://www.unito.it and http://www.agraria.unito.it
   Università degli Studi della TUSCIA http://www.unitus.it
   Università degli Studi di UDINE http://www.uniud.it
   Università degli studi di CATANIA http://www.unict.it
   Università degli studi di FOGGIA http://www.unifg.it
   Uiversità Statale di MILANO http://www.unimi.it
   Università di MODENA e REGGIO EMILIA http://www.unimo.it
   Università di PARMA http://www.unipr.it
   Università di SASSARI http://www.uniss.it
   Università di TERAMO http://www.unite.it

   In the academia context also the Agricultural Science Department of S. Anna School of Advanced Studies in Pisa (http://www.sssup.it), integrated with the State University, carries out research on OF&F. In addition, some departments belonging to different faculties (Medicine, Biology, Economy, Veterinary Sciences etc.) and related to human health disciplines, economy and marketing, plant and animal biology are involved in joint research projects on OF&F.

2. CNR - National Research Council: the national research body related to MIUR devoted to carry out research on all fields of knowledge, agriculture included (http://www.cnr.it).

C) Other Institutions

1. ENEA - National Body for New Technologies, Energy and Environment: (http://www.enea.it), research centre related to the Ministry of Environment.
2. IAMB - Mediterranean Agronomic Institute of Bari: (http://www.iamb.it), an Italian operating facility of international centre CIHEAM, enjoying the privileges of extra-territoriality attributed to international organisations by the Italian Republic.

D) Regional or local research centres

1. CRAB- Reference Centre for Organic Farming of Turin Province
2. CRPA - Research Centre for Animal Production (Emilia Romagna, http://www.crpa.it)
3. CRPV - Research Centre for Fruit and Vegetable Production (Emilia Romagna, http://www.crpv.it)
4. Experimental Centre for Organic Farming – ARSIA of Tuscany Region
5. Experimental Research Centre and Safe Crop Centre of S. Michele all' Adige Agricultural Institute (Trento Province, http://www.ismaa.it)
6. Laimburg Research Centre for Agriculture and Forestry (Bolzano Province, http://www.laimburg.it)

E) Funding

The main funding bodies at national level are ministries charged to finance research; in particular research in OF&F is supported by:

- MIPAF - Ministry of Agricultural and Forestry Policies
- MIUR - Ministry of Education, University and Research (mainly for Universities and CNR)
- MAE – Ministry of Foreign Affairs

Other national Bodies as CNR and ENEA can act as funding agencies supporting research in OF&F.

The newly constituted CRA, which groups 30 Institutes, is now an autonomous body (officially since 1st October 2004) planning, doing and financing by its own resources agricultural researches and experimentations, some of which are on OF&F.

At local level, regions and provinces support OF&F research with their own instruments; in addition, some "Interregional Programmes" concerted between national and regional governments can be financed under the provision of the general multi-year law for agriculture.

F) Stakeholders

Hereby the list of main stakeholder categories involved in OF&F, including organic farmers, processors, technical inputs producers (fertilisers, phyto-sanitary products) and consumers.

Association	Type
FEDERBIO Bodies and associations represented: • Associazioni Consumatori ed Utenti (Consumers) • Associazione Italiana Agricoltura Biologica (Producers, Consumers Technicians) • Associazione Marchigiana Agricoltura Biologica (Marche Region: Producers, Consumers Technicians) • AnaBio (Producers) • AQB (Control body) • Associazione Agricoltura Biodinamica (Biodinamic producers) • Assometab (Producers of Inputs (i.e. F, SC and PPP) allowed in OF • Bioagricert (Control body) • Bioagricoop (Producers, Consumers Technicians) • Biobank (Internet portal and press) • Bios (Control body) • Codex (Control body) • Consortium (Control body) • Ecocert (Control body) • SANA (Shows, events and communication) • Formaterre (Training) • ICEA (Control body) • IMC (Control body) • Proscenio (Internet portal) • QC&I (Control body) • Qualità Italia (Control body) • Sisdel (Consulting) • Suolo e Salute (Control body) • Terra Sana Italia • Terre dell'Adriatico (Adriatic regions Producers, Technicians)	National Federation of OF&F Associations and Bodies (control, certification, producers, farmers, consumers, technicians)
IFOAM Italia	Italian branch of IFOAM
CNCU Consiglio Nazionale Consumatori Utenti	Council of Italian Consumers Associations
CIA Confederazione Italiana Agricoltori	National Association of Farmers
COLDIRETTI Coltivatori Diretti	National Association of Farmers
CONFAGRICOLTURA Confederazione Agricoltura	National Association of Farmers
ASSITOL Associazione Italiana dell'Industria Olearia	Italian Association of Food Oil Industries
ASSOLATTE Associazione Italiana Lattiero-Casearia	Italian Association of Dairy Product Producers
FEDERALIMENTARE Federazione Italiana dell'Industria Alimentare	Italian Federation of Food Industry
ITALMOPA Associazione Italiana Mugnai e Pastai	Association of the Milling Industry
AIA Associazione Italiana Allevatori	Italian Association of Animal Breeders
FAI Federazione Italiana Apicoltori	Italian Beekeepers Federation
UNAPI Unione Apicoltori italiani	Italian Beekeepers Union
AIS Associazione Italiana Sementieri	Italian Association of Seed Producers
ASSOFERTILIZZANTI Associazione Industrie Fertilizzanti	Italian Association of Fertilizers (mineral and organic) and soil conditioners producers
CIC Consorzio Italiano Compostatori	Italian Composting Association: public and private companies, local authorities and others involved in the production of compost

3. Mapping research programmes

MIPAF resources

After the first project on biological control of plant pest and disease in 1988, systematically coordinated projects on organic and sustainable farming, voluntary submitted or directly assigned, were funded by the available resources for agricultural research in relation to their strategic role for the MIPAF policy planning.

In 2002, the National Research Plan on Organic Farming PNR-AB was issued; it was financed through the law no. 388/2000 and following modifications. On the same year the first and, at this moment, the only open call for OF&F was launched.

Table 1 lists MIPAF financed research projects according to the institutions of the participant research units (RU), starting from 1998 until present.

Table 2 groups the project budget based on the Organic Eprints subject areas, as agreed in the CORE Organic project. The reported budget refers only to MIPAF contribution to the following items:

- Personnel:
  - contracts only for temporary personnel
  - travel costs for all people involved in the projects
- Equipment (specific for the project)
- Consumables
- Overheads

The salaries of permanent contracts are not included, but they represent a self-financing of the participating research units. Until October 2004, the salaries of permanent researchers belonging to MIPAF Institutes were paid by MIPAF itself (General Affairs Department). The ongoing reform process has modified this situation: now the salaries of permanent contracts of those institutes joining CRA are directly paid by CRA as self-financing of its participant research units.

Moreover, in the years 2000-2004 a further amount of approximately € 2,500,000 has been devoted to some research actions on OF&F included in the annual institutional activity of the MIPAF research centres. For this amount, it is not possible to give a distribution according to the subject areas. Therefore, the following figures (1-3) do not include these resources for institutional activities.

In addition, the reported data on the national projects do not take into account further tasks or research actions related to OF&F financed by MIPAF but as a part of projects more largely focused on sustainable agriculture (i.e. National Research Plan for Citrus Production, Project on Horticulture, Project on Wild Fauna related to agriculture).

Figure 1 shows a graphic distribution of MIPAF resources in relation to the project participants. "Others" mainly includes public research centres (national or regional) and very few private ones (data from *table 1). Figures 2 and 3* report the resources and the financed projects grouped by subjects area (data from *table 2).*

Table 1. Projects financed by MIPAF from 1998 to 2005 (MIPAF data)

YEAR	PROJECTS	PARTICIPANTS (RU)			
	Voluntary submission/direct assignment	Tot	Univ.	MIPAF	Others
1998	1. Developing organic fertilization systems	2	-	2	
1998	2. Pest and disease management in organic farming	9	5	2	2
2000	3. Quality indicators in organic farming products	6	-	4	2
2002	4. Organic animal production in Italy: current situation and perspectives	4	-	3	1
2004	5. Plant essences as crop protectors in organic farming	2	2		
2005	6. Soil management, substrate production and plant nutrition for organic Mediterranean products	5	2	2	1
	7. Analysis of sheep-milk production by organic method	4	1	1	2
	8. Traceability markers for organic fruits	5	-	3	2
	9. Defining strategies to improve competitiveness of organic farming	5	2	-	3
	10. Strategies and alternative products to face the EU legal threshold values for copper in: wine; fruit-tree; vegetables; tomato	4	1	1	2
	11. Potato cultivars for organic farming	3	1	1	1
	12. Evaluation of new crop techniques for organic nursery	7	2	5	-
	13. Comparison between conventional and organic products	5	-	5	-
	Funding (projects 1-13)	**€ 5 394 000**			
2003	**Public Call**				
	14. Sustainable, traceable and safe organic olive oil production	7	5	2	-
	15. New production system for industrial crop: sugar-beet and tomato	8	2	2	4
	16. High quality production for organic hazelnut	8	4	3	1
	17. Economic, environmental and health sustainability in organic farming	5	3	1	1
	18. High quality production in fruit and vegetables for fresh and processed products	12	4	3	5
	19. Genetic and crop improvement for organic cereals – wheat, barley, oats	5	5	-	-
	20. Bioactive substances in the organic farming chain	1	1	-	-
	Funding (projects 14-20)	**€ 5 079 030**			
2000-04	Funding of institutional research activity of MIPAF-CRA centres on OF&F	**€ 2 500 000**			
	TOTAL FUNDINGS	**€ 12 973 030**			

Table 2. Financed projects according to subject areas (projects 1-20 of table 1)

Subject area	MIPAF Resources	Number of projects
Farming systems	1 196 970	2
Animal husbandry	86 000	2
Crop husbandry	6 761 387	11
Soil	600 000	2
Food systems	2 140 000	3
Environmental aspects	-	-
Values, standards and certification	-	-
Knowledge management	-	-
TOTAL FUNDINGS	**10 473 030 ***	**20**

* The sum does not include institutional research activity of CRA research centres.

Figure 1

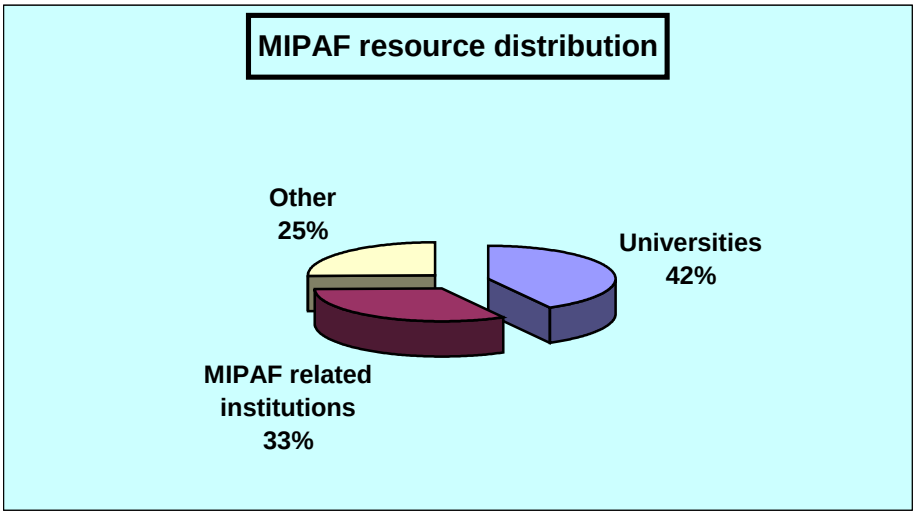


Figure 2

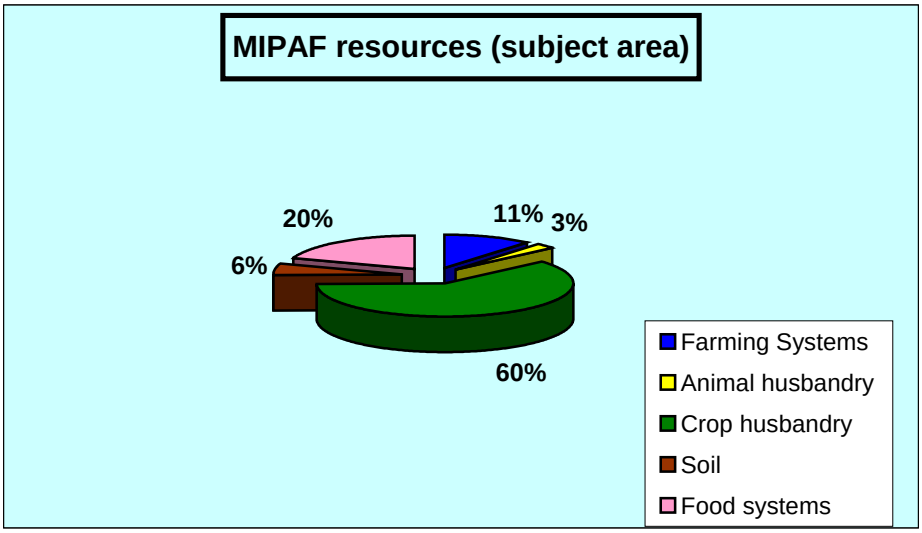
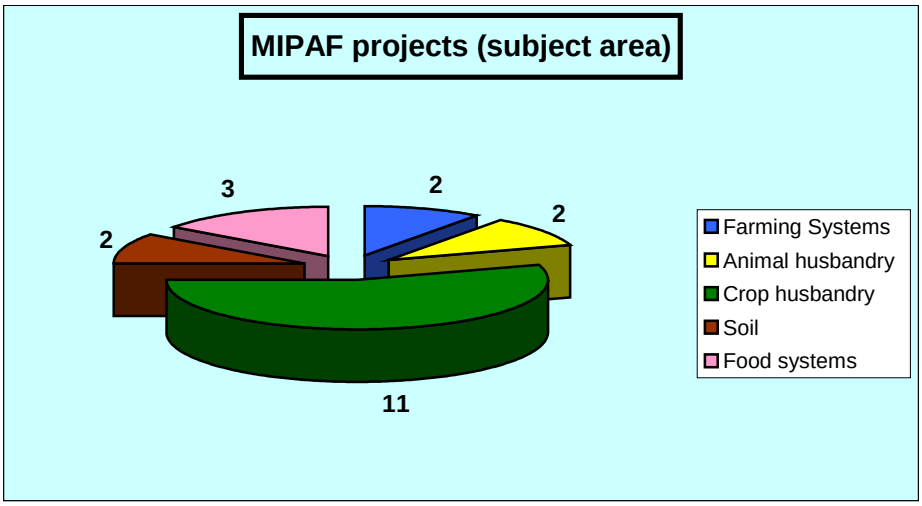


Figure 3



Other initiatives

Financial resources transferred to OF&F research projects by other funding sources cannot properly be estimated because of the plethora of initiatives and institutions involved and lack of information on project budgets.

A very general overview of subject area and funding bodies - updated at 2002 - is reported in *table 3.*

Table 3. OF&F Projects financed by public or private institutions*

Institution	Fruit-tree, grape and wine	Horticulture	Cereals and other crops	Husbandry	Human nutrition	Others	Total
Regions	19	18	16	11		1	**65**
Universities	5	3		2	2		**12**
Ministry of Research	1		2		1		**4**
CNR (National Research Council)		1	1				**2**
ENEA (National Body for Alternative Energy)	4		1				**5**
EU		1	5	3			**9**
Provinces, local institutions	19	4	4	1			**28**
Private	1		4				**5**
Total	**49**	**27**	**33**	**17**	**3**	**1**	**131**

- data mainly from CEDAS: Ricerca e sperimentazione sull'agricoltura biologica in Italia, Annuario 2002, CEDAS, Osservatorio Agroambientale, Forlì-Cesena, Italy; updated and modified.

More recently, a relevant initiative has been financed by the Italian Ministry of Education, University and Research in December 2005, the "SimbioVeg" project (organic farming methods and systems to improve plant production and environmental quality). It is a three-year project with a total cost of € 2 million (including co-financing of participating research bodies) involving seven

research units (universities, CRA, regional research bodies and OF&F associations) coordinated by the Agricultural Science Department of S. Anna School of Advanced Studies in Pisa. The project deals with crop husbandry, and more in details, with the study of different stockless production systems and several topics as soil tillage, weed management, crop quality, post harvest management and techniques, nutrient turnover, soil and environmental quality.

5. Research facilities

Public research institutions (universities, national and regional research bodies) in the more general context of sustainable agriculture usually manage the Italian research facilities available for Organic Food and Farming studies and experimentation. They are very fragmented and spread over different locations and climatic areas, thus an accurate monitoring is very difficult at this stage.

The Organic Eprints database will allow a better understanding of the OF&F available facilities, when fully operating.

A selection of facilities utilized in MIPAF funded projects is shown in the following *tables 4 and 5*. CRA, grouping 30 institutions, has facilities working on different OF&F subject area around Italy. *Table 6* shows the known long-term field experiments currently running in Italy.

Table 4. Facilities devoted to OF&F research in MIPAF funded projects

Type	Contacts	Dated/% OF&F	Further details
Laboratory/ analyses	CRA (Consiglio per la Ricerca e sperimentazione in Agricoltura - Agriculture Research & Experimentation Council) Stefano.bisoffi@entecra.it	from 1994; 20 -100 % dedicated to OF&F depending on the subject area. Approximately 300 m^2 labs used for OF&F in research centres located in different regions	state of the art laboratories and analytical instrumentation: spectroscopy, spectrometry, chromatography, molecular biology, NMR, rheology. These equipments are used for studies in plant pathology, entomology, soil chemistry & biology, plants and food related research for different areas: cereals, fruits, vegetables, flowers, olive oil, wine, aromatic plants (herbs), animal husbandry, beekeeping
	INRAN (Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione - Food & Nutrition Research Institute) paoletti@inran.it; mengheri@inran.it	from 1995; 500 m^2 labs (20 % used for OF&F research)	state of the art laboratories and analytical instrumentation for food technology, food chemistry, experimental nutrition; cells-micro-organism culture labs; experimental animal stables
	Dipt. Produzioni Vegetali - Univ.della Tuscia, Viterbo (Dept. Plant Production – Tuscia University) muleo@unitus.it	from 2004; 20 % OF&F 50 m^2 (20 % used for OF&F research)	
	Dipt. Biologia animale e Genetica-Univ.di Firenze (Dept. Animal Biology & Genetics- Florence University) mbuiatti@dbag.unifi.it	from 2004, 20 % OF&F	
	Istituto di Genetica Vegetale, CNR (Institute of plant genetics, National Research Council,) Perugia	50 m^2; 12 % OF&F)	state of the art laboratories and analytical instrumentation of molecular biology: DNA sequence analysis, DHPLC, nucleic acid electrophoresis, PCR
experimental/ demonstration farm	CRA (Consiglio per la Ricerca e sperimentazione in Agricoltura - Agriculture Research & Experimentation Council) stefano.bisoffi@entecra.it	1992 –2000, 100 % OF&F	about 45 hectares in experimental farms located in different regions devoted to: cereals, fruits, citrus, olive oil tree, vegetables, officinal plants, beekeeping; see also tab. 5
greenhouses	CRA (Consiglio per la Ricerca e sperimentazione in Agricoltura - Agriculture Research & Experimentation Council) stefano.bisoffi@entecra.it	2000; 30-50 % OF&F	greenhouses for cereals, vegetables, flowers, olive oil in the research centres located in different regions
	Dipt. Produzioni Vegetali - Univ.della Tuscia, Viterbo (Dept. Plant Production – Tuscia University) muleo@unitus.it;	2004; 20 % OF&F	160 m^2

Table 5. Location of experimental farms involved in some ongoing MIPAF projects

CRA Centres	*Location*	*Size*	*% area OF*	*Production*	*Year*
CRA - Experimental Institute for Fruits	Ciampino (Roma)	32 ha	6 %	Fruits	-
CRA - Experimental Institute for Soil	Fagna (Firenze)	40 ha	50 %*	Forage crops and cereals	1994
	Vicarello (Pisa)	20 ha	50 %*	Forage crops and cereals	1996
CRA - Experimental Institute for Olive tree	Rende (Cosenza)	3 ha	100 %	Olive tree	1997
CRA - Experimental Institute for Forestry	Villazzano (Trento)	0.3 ha	100 %	Officinal plants	2004
CRA – Experimental Institute for Citrus	Lentini (Siracusa)	25 ha	8 %	Citrus (Orange)	1996
CRA – Experimental Institute for Industrial Crops	Budrio (Bologna)	22 ha	10 %	Industrial crops	2000
CRA – Institute for Beekeeping	Reggio Emilia	70 bee-hives	20 %	Honey	2000
Other centres					
Cascina Vimagano, Graffignana (private)	S.Angelo Lodigiano (Lodi)	10 ha	100 %	Cereals	-
Experimental Centre and Agro-environmental Centre (regional)	Calcinaro (Cesena)	18 ha	7 %	Fruits	1996
Regional Experimental Centre of Mirto Crosia	Mirto Crosia (Cosenza)	12 ha	30 %	Olive tree	1997

* sustainable farming included

Table 6. Long term field experiments in Italy

Research Institution/Body and Contact Person(s)	Starting Year	Description/Aims/Size
CRA – (Experimental Institute for Citrus & Experimental Institute for Plant Nutrition) Giancarlo Roccuzzo (giancarlo.roccuzzo@entecra.it) Stefano Canali (stefano.canali @entecra.it)	1994	Studies on yield, quality of citrus, nutrient turnover in the soil-plant system, soil quality. Randomised block experimental design with 4 treatments (1 conv. + 3 bio different soil management strategies). 1.8 ha.
Univ. della Tuscia, Viterbo (Tuscia University) Fabio Caporali (caporali@unitus.it)	2001	Studies on cereals and pulses. Crop combination and interactions. 0.5 ha
Università di Pisa (Pisa University) Centro Interdipartimentale di Ricerche Agro-ambientali (*E. Avanzi*) located in S. Piero a Grado. Paolo Barberi (barberi@sssup.it) Marco Mazzoncini (mazzo@agr.unipi.it)	2001	Field crops (cereals and pulses) in a stockless farming system. Topics: yield and product quality, soil management, weed management, nutrient turnover, soil quality, crop interactions. Comparison of conventional *vs.* organic. 24 ha
Università degli Studi di Firenze (Firenze University). Azienda Agraria Montepaldi. Concetta Vazzana (concetta.vazzana@unifi.it)	1991	Field crops (cereals and pulses) in a stockless farming system. Topics: yield and product quality, functional biodiversity in relation to crop protection, green manuring, crop

Research Institution/Body and Contact Person(s)	Starting Year	Description/Aims/Size
		interaction, evaluation of allowed F+SC. Comparison of conventional *vs.* integrated *vs.* organic. 13 ha (microfarm experimental approach)
Università degli Studi di Perugia (Perugia University). Experimental station of the University, located in Papiano Guiducci Marcello (mguid@unipg.it) Arianna Boldrini (ariannaboldrini@yahoo.it)	1998	Field crops and open field vegetables (tomato) in a stockless farming system. Topics: yield and product quality, crop protection, green manuring, mechanical weed management, variety testing. Comparison of conventional (low input) *VS* organic. 1.4 ha
Centro Ricerche Produzioni Vegetali – CRPV (Cesena). Cristina Piazza	1996	Field crops and open field vegetables (tomato) in a stockless farming system. Topics: yield and product quality, green manuring. Comparison of conventional *vs.* organic + new technologies for OF. 8 ha.
Centro Ricerche Produzioni Vegetali – CRPV (Cesena). Vanni Tisselli (tisselli@crpv.it)	1995	Open field vegetables (horticultural specialised production system). Topics: effect of rotation, green manuring, variety testing, allowed inputs (F+SC and PPP) testing and evaluation. Aimed to develop new technologies for OF. 1.4 ha.
Centro Ricerche Produzioni Vegetali – CRPV (Cesena). Vanni Tisselli (tisselli@crpv.it)	1999	Open field vegetables for industrial transformation (i.e. green beans, spinach, pea, tomato) and cereals (not a specialised horticultural production system). Topics: effect of rotation, green manuring, variety testing, allowed inputs (F+SC and PPP) testing and evaluation. Aimed to develop new technologies for OF. 1.2 ha.

6. Initiation of research, stakeholder engagement and management of calls

Overall research programme (including agriculture)

Since 1998, a national law (D.L. 204/98) on reorganisation of the entire public research system has provided instruments and established rules to programme, finance and evaluate research and to reorganize public research structures. The general policy guidelines and the three-year National Research Programme (PNR) include strategic priorities and actions for agriculture and rural development research also proposed by MIPAF. PNR represents the national research framework, which all the specific programmes and projects are referred to. It also provides financial instruments (e.g. FISR - Fund for Strategic Research) allowing national bodies to launch co-financed research programmes through public calls.

To identify R&D requirements and investment priorities, a wide consultation with stakeholders, regional governments, farmers and industrial associations, academia as well as public and private research institutions has been carried out under the coordination of the Ministry of Education, University and Research.

The new National Research Programme (PNR 2005-2007) launched in March 2005, is in force for the next three years. It includes strategic macro-objectives to pursue life quality (health, safety, environment) and sustainable development, among which the strategic programme no. 9 on "Typical agro-food products exploitation and food safety through new systems to characterize products and to ensure quality" is specifically focused on the agro-food sector.

In July 2005, a call (DM MIUR 18/07 2005 no. 1621) open to the scientific community and to the industrial system has been launched to collect research project proposals on the realization of the strategic PNR programmes. Under the strategic programme no. 9, proposals with topics and actions related to OF&F are expected, as organic farming been recognized as a powerful tool to improve product quality, safety and environmental sustainability.

MIPAF programme for research in agriculture and OF&F

Furthermore, MIPAF is also responsible for programming and supporting the national research in agriculture, under the provision of the general long-term law for Agriculture (499/99).

In order to identify agricultural research needs and define strategic objectives and actions, MIPAF coordinates permanent consultation groups with farmers, agro-industry associations, scientific community and regional governments. The General Direction "Rural Development" through its Research Office is in charge to define research plans and launch public calls or direct assignments to the scientific community, select and evaluate projects realising the strategic programmes, objectives and actions agreed with the consultation groups and regions.

Under this general procedure and the financial programming law for 2001 (art 123, no. 388/2000), a National Research Plan on Organic Farming was defined by MIPAF at the end of 2001, after a consultation process involving the state-regions-autonomous provincial governmental conference and the National Committee on Organic Farming, appointed by ministerial decree. A public research call has been launched in 2002, to realize the plan and the selected projects are still going on.

The updating of the Action Plan has been done at the end of December 2005. The new National Strategic Plan on OF&F does not include specific research priorities but a reference framework of actions to strengthening the whole OF&F production chain.

Moreover, as the Italian legislation on OF&F is still under revision, specific research requirements are expected to bring about the new regulations.

Regional and local research

Regions and provinces can also autonomously define research programmes and fund research projects tailored to the specific requirements of their local agricultural and agro-industry system.

They have recently agreed on common approaches and methodologies to identify aspirations and research needs, priorities and research management procedures. An inter-regional network of regional research representatives has been established to create synergies, develop common procedures and give technical support to regional policy makers on agricultural research. This network operates through temporary groups with competence on different production chains or more general subjects, one of which is Organic Food and Farming. The research and investment priorities, defined by the groups of competence after local consultations and approved at political level by the Conference of Regions' and Province Governors, become the basis to launch common research calls at regional and inter-regional level.

The inter-regional network of research representatives has actively cooperated with the MIPAF Research Office and the Network of Agriculture Research Institutes related to the Ministry (now CRA) both on definition of research management methodologies and procedures, as well as on national research priorities identification. In 2005, a new project on animal husbandry has been approved under the financing scheme of Interregional Programmes, involving research centres and universities of different regions.

7. Selection criteria and evaluation procedures

The general procedure to select and evaluate agricultural research projects financed by MIPAF - Department of Development Policies (former Department of Quality and Agro-food Products) is in force also for OF&F projects. This procedure has been set up under the framework of the common rules and regulations for public administrations and its inspiring principles are shared by all public research funders.

Any project should meet a general requirement, that is, coherence with planning and programming documents issued by national Institutions (see paragraph 6: MIUR National Research Programme, MIPAF guidelines etc.).

Part of the annual budget (50 %) allocated at the above mentioned Department of MIPAF for research actions must be assigned to projects carried out by CRA.

Financing schemes of MIPAF research

There are three different ways to finance research: public calls, voluntary submission and direct assignment to carry out a specific project.

1) *Public call*: a call represents a specific set of rules to assign a certain budget to selected actions and it is published on the Official Journal of the Italian Republic and on the web site of MIPAF. The call is issued on the basis of EU and national regulations and it contains admitting requirements and evaluation criteria for presentation of proposals. The requirements can be defined from time to time, according to needs of a specific thematic area (i.e. OF&F).

A call must contain the following items:

- admission requirements
- general objectives and indications of research actions to be financed
- budget
- rate of co-financing, if any
- type and duration of projects, which can be financed
- evaluation criteria and their relative weight in relation to the type of project (specific annex for each call)
- deadline, procedures and organisms involved in proposal selection and conditions to negotiate the contract (financing and scientific-technical assessment)
- general conditions of the research contracts: eligible costs, cost statement, monitoring, etc.

A public call on OF&F was launched in 2002, by which seven projects have been financed for a total amount of about € 5,000,000 (for details see paragraph 3: mapping research programmes).

2) *Voluntary submission:* since 2003, every year from 1st April to 30th September researchers can submit an *expression of interest* proposal to apply for the annual budget assigned to "*curiosity driven"* projects or to parts of projects supported by other institutions, to be co-financed.
If the project *expression of interest* is approved (see below for evaluation criteria) an extended and detailed project can be submitted.

3) *Direct assignment:* this way is used for relevant research actions of public interest and carried out by specific expertises. Furthermore, in this case the scientific and technical quality of the proposal is evaluated through the general procedure described below.

During 2005, projects in OF&F for a total amount of about € 3,400,000 were financed under procedures 2) and 3). For further details, see *table 1*.

Types of research proposal

The complexity of the project, number of participants and budget can differ in relation to:

- kind of the proposed actions: basic research, applied research, experimentation and demonstration activities
- the general programme which the proposal refers to
- the general and specific objectives of the described actions

Independently from the presentation type, any proposal must include the following elements:

- description of the project and its upgrading as regards to the state of art
- objectives and expected results
- scheduling of the activities
- description of deliverables and milestones
- monitoring of the described activities
- methods and monitoring indicators to verify results
- dissemination and result exploitation
- estimated costs and their distribution over categories and time

Evaluation committee

A committee appointed by ministerial decree mainly carries out the evaluation procedure. This is a permanent organ and members can be changed or added.

For specific needs (monitoring of projects, call evaluation procedures) this committee can be assisted by experts chosen from the official list of the Ministry, established in 2003 and updated in 2005, following public calls. This was the case of the public OF&F research call of 2002, for which an *ad hoc* committee was appointed by the Minister (normally at least one member from the permanent committee must be included).

Evaluators must be independent, not directly or indirectly involved in the project under evaluation and must sign *a declaration form*.

Evaluation criteria

1) Criteria for project expression of interests:

- scientific expertise of the research proposer
- fair ratio of proposed actions/available resources (capacity to carry out the research)
- appropriate budgeted costs in relation to the proposed actions
- clearness and verifiability of the overall objectives and results
- degree of scientific innovation compared to the actual know how
- suitability of the described methods to the declared objectives

2) Extended projects: in addition to the above-mentioned criteria, the evaluation criteria are more detailed and grouped under these more general topics:

- scientific-technical quality and innovation (including interdisciplinarity, multidisciplinarity, etc.)
- coordination and resources management; including appropriate project size, cost and duration; integration among the research group
- contribution of the project to the overall programme objectives (coherence with call overall objectives and/or to the Ministry research policy guidelines)
- scientific, social and economic impact of the project, including contribution of the project to solve the problem, stakeholders/users involvement, dissemination of the results and efficacy of knowledge transfer to the agriculture system

Monitoring and ex-post evaluation

Internal monitoring: in each project a monitoring plan is required to check scheduled activities, milestones and deliverables, and propose corrective actions. This plan, as part of the project, is submitted for approval.

External monitoring: experts appointed by MIPAF to the projects monitor the ongoing activities on the basis of periodic scientific reports, annexed to the cost statements, and of any other information given by the coordinator under request. This monitoring can be carried out by the same experts of *ex-ante* evaluation or by someone else, being the decision of the Ministry.

Usually, ex-post evaluation of single projects is not systematically carried out, but an assessment of project results previously obtained is done before financing new projects on similar subjects, mainly if the proposals are coming from the same proponent.

8. Utilisation of research

The more common way to disseminate research results is by publication, workshops and meetings usually organised in the framework of each project. Often these meetings are not only addressed to the scientific community, but other participants from public administrations (national, regional or local), technical offices and stakeholders are invited too, having the opportunity to take part in the discussion.

The transfer of innovation to farmers is ensured by the technical assistance of regions and local institutions, having among their institutional tasks to disseminate knowledge, results and innovation. This task is carried out in cooperation with farmer and producer organisations, under specific regional regulations.

9. Scientific education and research training

Universities are devoted mainly to the scientific education through the 23 Faculties of Agriculture listed in paragraph 2 B). Following the last reform in 2001, the old 4-5 year degree is under completion and now an Italian university can release two different degrees:

- 3 years degree (1st level, L);
- 2 years specialist degree (2nd level, LS).

Moreover, some Universities offer specialisation courses and masters after graduation. Some university courses and masters have generally been devoted to sustainable agriculture, but in the last few years specific organic farming courses have been established with the main objective to training high level technicians in OF&F and, in some cases, also in biodynamic agriculture.

In *table 7*, a review on main university courses and masters now ongoing is presented.

Table 7. Italian university courses, masters and PhD in OF&F

University	University Courses	Type	Requirements	Years
Pisa	Agricultural Sciences (organic and multifunctional farming)	L	high school	3
Torino	Plant Production (Organic farming productions)	L	high school	3
Viterbo	Agricultural Sciences (Agro-ecology)	L	high school	3
Palermo	Organic Farming	L	high school	3
Firenze	Organic and Environmental Farming	LS	1st graduation	2
Pisa	Agricultural Sciences (organic and multifunctional farming)	LS	1st graduation	2
Torino	Agro-ecology	LS	1st graduation	2
Viterbo	Agricultural Sciences (Agro-ecology)	LS	1st graduation	3
	Masters			
Bologna	Sustainable Development and Agro-environmental Systems Management		1st graduation	1
Firenze	Agro-ecology (organic and biodynamic farming)		1st graduation	1
Milano	Management, Control and Marketing for Organic Production		1st graduation	1
Napoli	Organic Farming		1st graduation	1
Pisa	Exploitation and Control of Quality Agro-food Production		1st graduation	1
Siena	Communication for Wine and Food, typical and Organic Products		1st graduation	1
Mediterranean agronomic Institute of Bari (IAMB-CIHEAM)	Mediterranean Organic Farming		1st graduation (mainly for students from developing countries)	

MIPAF contributes to scientific education and research training both financing fellowships, grants and contracts for young researchers in the framework of ongoing projects and with added resources to the project budgets. In the latter case, only CRA research units can benefit from education and training fundings for graduate and post-graduate students carrying out their activity under the supervision of CRA researchers. MIPAF can also fund PhD grants, but at this moment there are no PhD grants in OF&F.

The MIPAF budget specifically devoted to OF&F education and research training in the last years is reported in *table 8*.

Table 8. MIPAF resources for fellowships and research training on OF&F

Year	Number	Type	Budget €	Duration (years)
2001	15	Research training contracts	232,000	3
2003	12	Fellowships for graduate students (2nd degree)	180,000	2
2003	22	Research training contracts	341,000	3
Total			**753,000**	

CORE Organic Country Report

Research in Organic Food and Farming in The Netherlands

Ede, December 09, 2005

Prepared by Eddy Teenstra, Innovation Centre Organic Agriculture of Wageningen University and Research Centre (IBL) and Eric Regouin, Ministry of Agriculture, Nature and Food Quality, Department of Knowledge Policy.

This country report is prepared within the framework of the ERA-Net project CORE-Organic, financed by the European Commission, duration October 2004 – October 2007. In this Project eleven European countries work together to better coordinate the individual and collective research efforts in the field of Organic Food and Farming.

Photo: www.biologica.nl/beeldbank; Biologica is the Dutch umbrella organisation for organic farming and food.

Content

1 History

The cultivated area under organic farming in the Netherlands is rather small (i.e. 2.2%) compared to the European average. The organic sector in the Netherlands is relatively young. The regulatory framework for (independent) control and certification of the cropping sector only exists since 1992 with the EU regulation 2092/91. It was expanded in 2000 with the regulatory framework for the animal sectors (EU regulation 1804/1999). With this clear legal status and with harmonised definitions the organic sector is in a better position to participate in the already existing national knowledge infrastructure. The Ministry of Agriculture, Nature and Food Quality (LNV) in the Netherlands has funded research on organic agriculture since the eighties, mostly directed toward crop production. Research on organic pig husbandry and poultry only started in 2002.

In 2001, the Ministry of Agriculture, Nature and Food Quality produced her policy on organic agriculture, aiming at a market oriented organic production. The main objective presented in this policy document is that 10 % of the total cultivated agricultural area will be under organic farming in the Netherlands by the year 2010. One of the policy instruments to be applied to reach this objective is research on organic production. This policy resulted in an increase in organic farming research funding by the Ministry from 3 million in 1999 to over 10 million in 2003.

In 2004, this policy on organic agriculture was evaluated. The evaluation included results of research and knowledge efforts and a new policy document for the period 2005-2007 was approved by Parliament. The new (or prolongated) policy ambitions are:

- 10 % of the total cultivated area will be under organic farming by 2010
- market share of organic products will be 5 % of total consumer spending by 2007
- the innovative strength of the organic production sector concerning sustainability will be enlarged by 2007.

Knowledge (development, dissemination, distribution, extension, demonstration and implementation) remains to be an important instrument to fulfil these policy ambitions. However, there will be a shift from knowledge development toward knowledge dissemination in the period covered by the current policy. Organic farming may serve as a showcase of the innovative power to improve sustainability and may inspire implementation in conventional farming practice.

Until recently, public funded research mainly focussed on primary production, as most problems were related to technical imperfections. This effort had a positive effect on organic production, but had no effect on consumer behaviour and thus did not make the sale of organic products concomitantly increase. The governmental policy, to aim at a market oriented organic production however, demands a shift towards more knowledge on chain and produce related issues i.e. consumer awareness, food safety and food quality and appropriate production costs. Fitting organic farming systems into the rural environment or even into urban life also needs a shift in focus of research towards a multifunctional approach. This implies a shift from an approach with pure exact sciences towards an approach with exact and social sciences combined. Researchers will work in teams with different expertises, varying from technical experience to social-economic skills. The research groups consequently consist of researchers from different research institutes and universities, guaranteeing a systemic and holistic approach.

2 Organisation

The Ministry of LNV provides most of the necessary funds for research in Organic Food and Farming. Within the Ministry of LNV in 2005, several so-called sectoral 'Cluster Boards' are set up, including one for organic agriculture. These Cluster Boards deal with all research related issues.
Within the policy objective of increasing the area under organic cultivation, the organic production sector has been given a major role in proposing how and where to spend the financial resources. Ultimately the Cluster Board within the Ministry of LNV makes all final decisions, after

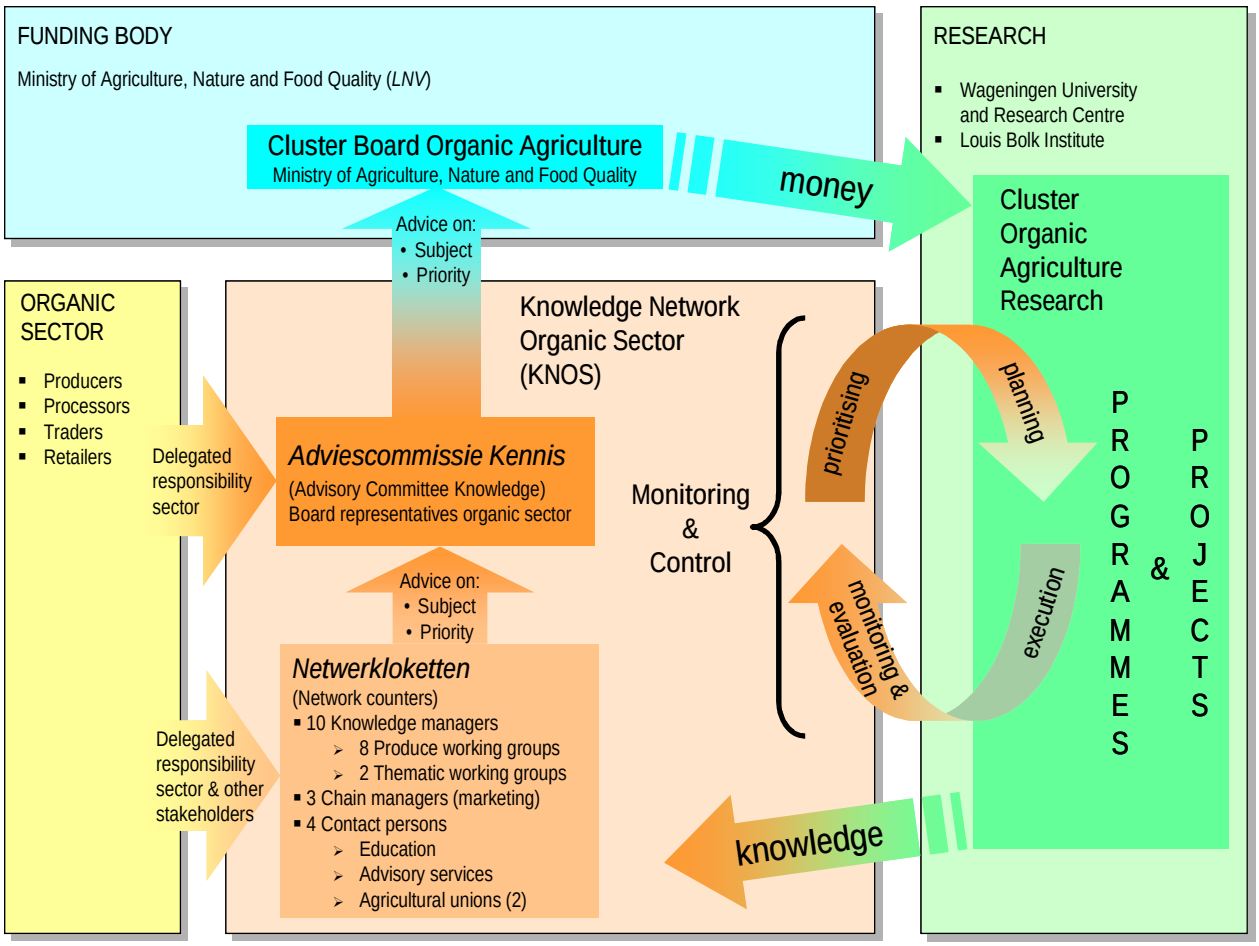


Figure 1. Schematic impression of the demand driven organization of publicly funded specific organic research in the Netherlands.

having established that eventually the generated knowledge contributes to the policy objectives. In this way, organic research in the Netherlands is strongly demand driven.

2.1 Situation as from 2006

Figure 1 gives an impression on how organic research in the Netherlands is organized starting in 2006. Note: this scheme only applies to the publicly funded specific organic research.
Key body in the scheme is the recently instituted Knowledge Network Organic Sector, with the given name Bioconnect (KNOS in Figure 1). All relevant stakeholders from the organic sector are represented in this Network. On a yearly basis, Bioconnect makes recommendations to the Ministry of LNV – organised in the Cluster Board Organic Agriculture – on the subjects and priorities to be set for research in organic agriculture. In general, the Cluster Board, which has the final decisive power, will adopt the recommendations and direct them to the manager of the Cluster Organic Agriculture Research.
The Bioconnect system is financed by the Ministry of LNV for a large part, because of its instrumental role in defining research priorities.

The recommendations of Bioconnect are based on input from the organic agricultural sector (knowledge demands) and on the monitoring and evaluation of ongoing research activities (knowledge supply). Decision making on research subjects and priority setting takes place at two levels: a detailed level and a board level.
The detailed level is covered by several so-called *Netwerkloketten* (Network Counters). These are the gathering places where sector and trade stakeholders put forward their problems (i.e. knowledge gaps) in further developing their organic agriculture activities. On a subject basis these *Netwerkloketten* discuss the details of knowledge demands, project proposals, the projects being

carried out, research results and the final knowledge dissemination, with representatives of the research institutes. Each Counter then lists these knowledge problems and makes a recommendation on which of them still needs to be solved through research, assigns priority to each, and forwards the whole lot to the *Adviescommissie Kennis*.
The *Adviescommissie Kennis* (Advisory Committee Knowledge) sorts out the input provided by the respective *Netwerkloketten*. The Committee establishes the subjects and priorities to be presented in its recommendations to the Cluster Board Organic Agriculture.

The major part of the Dutch research effort in organic agriculture is carried out by Wageningen University and Research Centre and by the Louis Bolk Institute, often in close cooperation. For management purposes, all specific organic research is grouped and coordinated by a research "cluster manager" acting as the research representative towards both the Ministry of LNV and Bioconnect. The research cluster encompasses several major organic research programmes.

2.2 Historical situation

Until 2006, every research programme is monitored and controlled by a programme specific supervisory committee. These committees are chaired by a LNV representative and staffed by representatives of regional governments (provinces), the organic farming sector and other stakeholders based on their subject matter knowledge and their involvement in the programme. This organization can be characterized as complete but not very efficient in situations with more than one research programme covering a whole sector as in organic agriculture (see table 1). It produces a huge workload for the Ministry and to a lesser extent also for the other members. In the new situation as described above, much of the workload is shifted from the Ministry to the organic sector (Bioconnect).

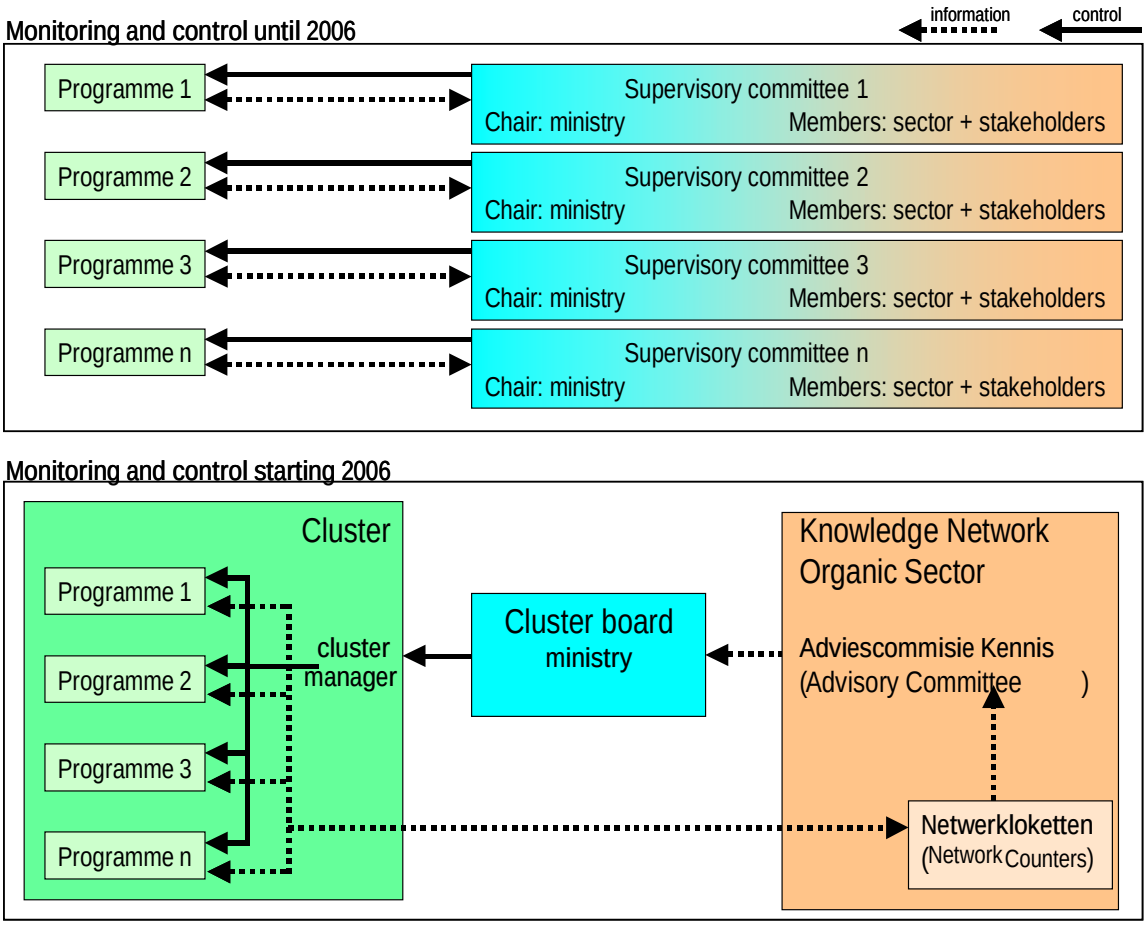


Figure 2. Monitoring and control. Organization of (organic agriculture) research in the Netherlands before and after January 2006.

Figure 2 shows the present and future organization of monitoring and control. Important differences are (1) reduction in the number of supervisory meetings; (2) reduction of necessary ministry staff; (3) clear differentiation in the purpose of meetings and the level of detail; (4) better overall view on the developments in the organic sector; and (5) less flexibility for topical events.

2.3 Stakeholders

All primary stakeholders, being members of the organic production and supply chain (production, processing, marketing and sales) and thus directly dependent on a flourishing organic sector, are represented in the *Netwerkloketten* of Bioconnect.
Important primary stakeholder parties are:

- Biologica, sectoral policy and advocacy organisation, which lobbies Government, coordinates sectoral initiatives aimed at improved cooperation in marketing chains, and coordinates the sector's research agenda priorities through its *Adviescommissie Kennis*. Biologica is also involved in many activities of information to consumers.
- *Vereniging van Biologische Producenten* (VBP). Association of Organic Producers: uniting a substantive proportion of the organic sector's importers, processors and traders.
- *Vakgroep Biologische Landbouw* of the *Land- en Tuinbouworganisatie Nederland* (LTO), the forum of organic producers within the National Farmers Union.
- *Centraal Bureau Levensmiddelen* (national organisation of retailers)

Secondary stakeholders, being members of the knowledge chain, are also represented in the *Netwerkloketten*. Secondary stakeholders can be seen as facilitators of the primary stakeholders, or are service providers. They comprise of:

- Ministry of Agriculture, Nature and Food Quality (LNV), as advisor
- *Platform Adviesdiensten Biologische Landbouw* (farm advisory services in organic agriculture)
- *Kenniskring Onderwijs Biologische Landbouw* ('green' education)
- Taskforce Market Development Organic Agriculture
- *Stichting Agro Keten Kennis* (AKK) (supply chain facilitator)

Although the research establishment could well be regarded as a secondary stakeholder also, representatives of research institutes are formally not present in the *Netwerkloketten*. It would potentially constitute a conflict of interest if they were.

The public authority, i.e. the Ministry of LNV, is a major stakeholder but her interests are expressed outside the structure of Bioconnect, through the Cluster Board Organic Agriculture, within the Ministry.

2.4 Research Institutes

Two institutions are responsible for the major part of organic research in the Netherlands:

a) Wageningen University and Research Centre (Wageningen UR)

Wageningen UR is a holding of the Wageningen Agricultural University, the Larenstein Agricultural College and a number of agricultural research institutes, both at the strategic and applied level. Wageningen University offers a vast number of full academic BSc, MSc and PhD programmes in all life sciences.
Coordination of organic agricultural research within Wageningen UR is conducted by the ***Innovatiecentrum Biologische Landbouw*** (IBL - Innovation Centre Organic Agriculture). See fore more details http://www.ibl.wur.nl and http://www.biologischelandbouw.net.

IBL coordinates, stimulates and initiates the development and integration of knowledge on organic agriculture and food within Wageningen UR and where possible, beyond. Its main target groups in the Netherlands are researchers, policy makers, members of the production chain, students and teachers in middle and higher education, advisory/extension services and social organisations with an interest in sustainable agriculture. Within the international context IBL mainly targets research organizations. It also assists the Ministry of LNV in its CORE Organic activities.

The following institutes and/or entities of Wageningen UR are involved in organic agricultural research:

- **Agricultural Economics Research Institute of Wageningen UR (LEI)** is a leading institute for social and economic research on agriculture, horticulture, fisheries, forestry and rural areas. The LEI's focus at both national and international level is the increasing integration of agriculture and agribusiness with the social environment.
- **Agrotechnology & Food Sciences Group (AFSG)** is the organisation for knowledge development and knowledge transfer in the field of sustainable applications for safe food and non-food products. AFSG creates, by combining expertises, inspiring options and concrete solutions in close cooperation with the Government, business and industry. AFSG unites, as of December 2005, the Department of Agrotechnology and Food Science and the organisation for Agrotechnology and Food Innovations.
- **Alterra** - Research Institute for the Green World of Wageningen UR offers a combination of practical and scientific research in a multitude of disciplines related to the green world around us and the sustainable use of the living environment. Flora and fauna, soil, water, the environment, geo-information and remote sensing, landscape and spatial planning, man and society are a few of the numerous aspects of the green environment Alterra focuses on.
- **Animal Sciences Group (ASG):** Its research and education covers the entire animal production chain (including fish culture, fisheries and companion animals) and is done on an international scale. ASG is able to tackle their client's individual problems by calling on the expertise of the best and most appropriate group through intensive collaboration between science, application and practical experience and through interaction of all the disciplines.
- **Applied Plant Research (PPO)** is the leading Dutch organisation for applied research in arable farming, multifunctional agriculture and outdoor vegetable growing, bees, flower bulbs, nursery stock, fruit, greenhouse horticulture and mushrooms. PPO aims at co-innovations with partners from the different agricultural sectors, sciences, industry and Government. PPO analyses together with clients, questions regarding farm and crop management and translates these into applied research and development programmes.
- **Plant Research International (PRI)** integrates knowledge in the fields of genetics and reproduction, crop protection, crop ecology and agricultural systems. Thus, Plant Research International offers a host of perspectives to industry, agriculture, horticulture and agro-ecosystems linked to farm management and nature development.
- **RIKILT - Institute of Food Safety** evaluates food quality and safety. This covers food constituents, agro-chemicals, environmental contaminants and natural toxins. It conducts fundamental-strategic and applied research for national and international governments, as well as industries and supports the policy of the Dutch Government with research and advice. RIKILT also has expertise on quality and supply chain management needed to improve production processes and product quality in the agro-industry.

b) Louis Bolk Institute (LBI)

The Louis Bolk Institute is a forerunner and initiator in fields of research unique on: homeopathic medicine, organic farming and organic food. It sees an intimate connection between farming, food and human health. LBI's research draws upon the valuable knowledge and experience of innovative practitioners – farmers, doctors and therapists. What these people demonstrate in their work is then extrapolated to a wider overall context, systemised, and scientifically underpinned. It thereby contributes to solutions that benefit the system as a whole. All this is bound by its search for health and quality of the overall system: its vitality and its capacity for self-regulation. LBI defines 'quality' as the extent to which a product expresses the intrinsic nature of a plant or animal.

3 Mapping research programmes

Research programmes in organic agriculture in the Netherlands can be divided into two categories:

1. Policy and legislation related projects in which the end-use of the research result is input into Dutch policy development and /or Dutch positioning in the EU legislative context.
2. Commodity and farm related projects in which the goal is to further develop the organic agricultural sector, targeting all components of the production and supply chain.

Although the number of policy and legislation related projects shows a big increase over the last few years, thereby giving extra support to (inter)national policy development and the policy related legislation, in the context of CORE-Organic this Dutch country report mainly focuses on commodity and farm related research.

Off-farm commodity related subjects (chain, market and consumer, food safety and food quality) are given more priorities since 2002. Still the slowly reducing number of farm enterprise related projects uses almost thirty percent of the total research budget. Themes comprising more technical farm disciplines show a distinct priority shift from Living Propagation Material and Resistance Breeding to Plant Protection and Weed Control. Table 1 presents the list of ongoing and recently ended research programmes.

Due to further urbanization one expects agriculture to diversify into small-scale, regional oriented farming on one the hand and large scale, global market oriented farming on the other hand. It requires a strategic vision on the transition to a production system that is more integrated in social life, well equipped to follow global trade and sustainablility in the sense of People, Planet and Profit. At the same time, this production system has to deal with global warming and concomitantly upcoming water stress and drought.
From the perspectives of the general policy of the Ministry of Agriculture, Nature and Food Quality and its specific policy on organic agriculture, the following areas of research need more attention in the next years (2005-2007) and - to our opinion - have high potential for cooperation on European level:

1. Food and feed quality and safety ((myco)toxins, heavy metals, residues)
2. Desirable food characteristics with respect to health
3. Simplification of legislation
4. Consistence in certification legislation
5. Impact of organic farming on the rural environment, regional aspects
6. Function of organic farming at the periphery of urban conglomerates

Dutch funding of transnational research in general will be restricted to research into these areas. The Dutch contribution to the common pool in CORE organic will depend on national approval. This concerns the subjects chosen for transnational cooperation and the programme and project proposals (including the budget) based on those subjects.

Table 1. Publicly funded organic research programmes.

Programme Title	Acronym	99	00	01	02	03	04	05	06	07
Weed Control	343 *	x	x	x	x					
New Animal Husbandry Systems	348 *	x	x	x	x					
Natural Resistance (Animals)	349 *	x	x	x	x					
Organic Production Systems in Arable Crops and Open Field Vegetables	342	x	x	x	x					
Organic Plant Breeding	342b		x	x	x	x				
Entrepreneurship and Market (Phase 1)	374 *		x	x	x	x				
Animal Husbandry (Phase 1)	PO-34		x	x	x	x	x			
Plant Propagation Material	388-I			x	x	x	x			
System Innovation Open Field Crops	BO-04-400 I				x	x	x	x		
System Innovation Protected Crops	BO-04-400 II				x	x	x	x		
Umbrella Programme	BO-04-401 I				x	x	x	x		
Crop Protection	BO-06-397 *				x	x	x	x		
Reducing Mineral Losses	BO-05-398 *				x	x	x	x		
Sustainable Multifunctional Farming Systems	400 V *				x	x	x	x		
Intersectoral Cooperation	BO-04-401II					x	x	x		
Co-innovation Programme Organic Marketing Chains	423 *					x	x	x	x	
Reducing Disease Burden of Phytophtora infestans	427 *					x	x	x	x	x
Entrepreneurship and Market (Phase 2)	433 *						x	x	x	x
Plant Breeding	BO-04-388 II						x	x	x	x
Animal Husbandry (Phase 2)	BO-04-002							x	x	x

* only partially organic

4 Financing

The Netherlands' Ministry of Agriculture, Nature and Food Quality mainly fund research programmes.

Table 2. Financial overview of organic research by Wageningen UR and the Louis Bolk Institute in 2000 - 2004 according to themes in EUR x 1000.

Theme	2000	2001	2002	2003	2004	total
1 Farming systems	2,139	2,840	3,657	4,362	3,486	16,484
2 Animal husbandry	568	684	794	1,489	1,373	4,907
3 Crop husbandry	1,709	3,235	5,209	5,255	4,970	20,377
4 Soil	0	0	85	85	85	255
5 Environmental aspects	0	0	85	85	85	255
6 Food systems	72	254	257	722	327	1,632
7 Values, standards and certification	19	37	12	22	28	118
8 Knowledge management	149	159	458	462	322	1,550
total	4,656	7,209	10,556	12,481	10,676	45,578
% Wageningen UR	92,7	89,9	94,5	94,4	94,9	93,7
% Louis Bolk Institute	7,3	10,1	5,5	5,6	5,1	6,3

Period 2000 – 2004

Table 2 gives an overview of the organic research programmes and their annual budgets according to the main themes in Organic Eprints. Many research programmes focus on developing and optimising farming systems in animal husbandry and in crop husbandry. Within these programmes aspects of soil and environment are also covered. For pragmatic reasons the budgets of these systems innovation like programmes is divided over only the first three themes. This explains the relatively low budgets spent on the themes soil and environmental aspects.

Table 3. Financial overview of ongoing organic research programmes by Wageningen UR in 2005 in EUR x 1000. For more detailed information see Organic Eprints.

Acronym	Programme Title	Budget
388-II	Plant Breeding	418
400-I	System Innovation Open Field Crops	1,795
400-II	System Innovation Protected Crops	1,198
BO-04-001	Umbrella Programme	709
401-II	Intersectoral Cooperation	322
BO-04-002	Animal Husbandry (phase 2)	2,158
BO-04-003	Plant Propagation Material (phase 2)	825
433	Entrepreneurship and Market (phase 2)	79
398-I	Reducing Mineral Losses	170
397-II	Crop protection - control measures	286
397-IV	Crop protection - control strategies	264
397-V	Crop protection - innovative weed control	641
427	Reducing Disease Burden of Phytophtora infestans	45
400-V	Sustainable multifunctional farming systems	65
	Total	8,974

Period 2005 – 2007

The annual national budget for 2005 until 2008 is approx. 7.5 million EUR for specific organic research. However, some organic subjects are covered by thematic research programmes, which are not specifically organic. This applies i.e. for research on reducing mineral losses, weed control, crop protection, entrepreneurship and market. The annual budget for the organic part of these research programmes is approx. 1.5 million EUR. Table 3 gives an overview of the current research programmes and their budget. In addition, table 4 presents the budgets according to the main themes in Organic Eprints.

Table 4. Financial overview of ongoing organic research by Wageningen UR and the Louis Bolk Institute in 2005 according to themes in EUR x 1000.

Theme	Budget	%WUR	%LBI	Programmes involved
1 Farming systems	2,969	97,6	2,4	400-I, 400-II, 401-II, BO-04-002 + LBI
2 Animal husbandry	1,156	93,3	6,7	BO-04-002 +LBI
3 Crop husbandry	4,124	96,4	3,6	388-II, 400-I, 400-II, BO-04-003, 397, 427 +LBI
4 Soil	85	100,0	0,0	398-I
5 Environmental aspects	150	100,0	0,0	398-I, 400-V
6 Food systems	80	98,8	1,3	433 +LBI
7 Values, standards and certification	4	0,0	100,0	LBI
8 Knowledge management	709	100,0	0,0	BO-04-001
Total	9,275	96,8	3,2	

Research facilities do not directly receive public funds. They are financed through the research activities at these facilities. Since all research facilities (e.g. experimental farms and laboratories) belong to private research institutes, the costs of those facilities are calculated within the required budgets.

5 Research facilities

Research Farms

- *Proef- en Leerbedrijf Droevendaal* in Wageningen is the organic research and education farm of the Plantkundig Proefcentrum Wageningen of Wageningen UR (PPW). It covers 50 ha of which 32 ha is actually available for research and education purposes. The remaining 18 ha consist of permanent pastures and nature. Droevendaal is a mixed farm aiming at a closed cycle. The permanent herd comprises of 65 bull calves from Aver Heino, Centre for Organic Farming, for the production of 'organic young beef'.
- *Aver Heino*, Centre for Organic Dairy Farming, is a research unit of the Animal Sciences Group of Wageningen UR (ASG). The research focuses on all aspects of organic dairy farming.
- *Raalte*, Centre for Sustainable and Organic Pig Farming, is a research unit of the Animal Sciences Group of Wageningen UR (ASG). The organic unit can accommodate 100 breeding sows and 600 growing finishing pigs.
- *Het Spelderholt* is a research unit of the Animal Sciences Group of Wageningen UR (ASG). It has facilities for all kinds of poultry (layers, broilers, turkeys and ducks) and for rabbits. There is also a hatchery. Attention is paid to animal welfare, organic farming, environment, health, feeding, economics, labour and working conditions. One stable has a capacity of 2,000 organic laying hens divided over 8 experimental subunits.
- *Proefboerderij De Noord* is a research unit of Applied Plant Research (PPO), Sector Bulb-growing of Wageningen UR. Beside two integrated farm systems the unit has an organic farm system (3 ha) with several kinds of flowering bulbs, representing the organic bulb-growing farms in the north-west of the Netherlands.
- *PPO Nagele* is a research unit of Applied Plant Research (PPO), Sector Arable Farming, Rural Area and Open Field Vegetables of Wageningen UR. The unit consists of four farming systems:
  - Biodynamic system with arable crops and open field vegetables representing the organic farms in the northern and central clay areas of the Netherlands (22 ha)
  - Bio-intensive system with field vegetables, representing the smaller organic farms (12 ha)
  - Bio-diverse system with optimal use of biodiversity to control diseases and plagues (12 ha)
  - Integrated system with arable crops representing the conventional farms in the northern and central clay areas of the Netherlands (24 ha).
- *PPO Vredepeel* is a research unit of Applied Plant Research (PPO), Sector Arable Farming, Rural Area and Open Field Vegetables of Wageningen UR. Beside an integrated farm system, the unit has an organic farm system (4 ha) representing the organic arable farms in the south-east of the Netherlands with vegetables for industrial processing.
- *PPO Westmaas* is a research unit of Applied Plant Research (PPO), Sector Arable Farming, Rural Area and Open Field Vegetables of Wageningen UR. Beside an integrated farm system, the unit has an organic farm system (1.2 ha) with open field vegetables, representing the more extensive organic arable farms in the south-west of the Netherlands.

- *PPO Prof. Broekemahoeve* is a research unit of Applied Plant Research (PPO), Sector Arable Farming, Rural Area and Open Field Vegetables of Wageningen UR. The farm is used for farm systems research focussing on two factors: low use and no use (organic) of pesticides and production aiming at communities experiencing agriculture and bulk production.
- *Regionaal Onderzoek en Informatie Centrum Kollummerwaard* regional research and information centre of Stichting Proefboerderijen Noordelijke Akkerbouw (SPNA - Experimental Farms Northern Agriculture Foundation). The farm consists of a conventional and an organic unit for the production of arable crops and open field vegetables.
- *Proefboerderij Rusthoeve* is a privatised arable research farm with a conventional and an organic part. The Rusthoeve is also a pilot farm for nature management.
- *Proeftuin Zwaagdijk* is a privatised research farm of the Proeftuin Zwaagdijk Foundation dealing with open field vegetables and bulb cultivation in an organic and in a conventional setting.

Knowledge Networks[1]

In the past, knowledge on technical solutions for farmer use was mainly produced at the research centres. Advisers and farmers were instructed on technical improvements within their farm systems and methodologies. It turned out, however, that this knowledge dissemination system was insufficiently tuning to the demand for knowledge of individual farmers. Since a few years, many research activities have been moved towards private farms and experiments are conducted in a participatory way together with the entrepreneurs. Farmers and researchers are organized in socio-technical knowledge networks for knowledge dissemination and mutual support. In this way, research aims are better tuned to farmers' individual and collective demands and generate solutions for local problems. In this respect one can also refer to them as problem-oriented knowledge networks. Knowledge will be transferred from researcher to farmer and vice versa, resulting in an intense knowledge circulation and construction. Upscaling and developing generic solutions are the new scientific challenges.

The effectiveness of the participation in these knowledge networks differs between farmers. Real innovations in farming systems only occur when farmers are front liners. Examples of remunerative organic farming systems inspire conventional colleagues, thus making farming as a whole more sustainable. It is the result of a good balance between the future oriented innovative power of the pioneers and the effective interaction with and spin-off to study groups of the more conventional farmers and other parties involved in the production-consumption chain.

At present, the following knowledge networks are active:

- *Bioveem: dairy husbandry, 17 farmers*
- *Biom: 40 farmers*
  - arable crops and open field vegetables,
  - tree nursery
  - bulbs
- *Ekopluim: poultry, 18 farmers*
- *Biofruitteelt: apple and pear production, 3 farmers*
- *Biokas: protected (covered) crop production, 6 farmers*

Private Farms

Beside the above mentioned farms participating in knowledge networks, much research is performed at private commercial farms. This especially applies to the research conducted by the

[1] do not confuse with Bioconnect, the Knowledge Network Organic Sector

Louis Bolk Institute, since it has no research facilities (e.g. experimental farms) of its own. It is also the LBI view that research should be conducted on-farm in order to increase the usefulness of the results.

6 Initiation of research and stakeholder engagement and management of calls

6.1 Wageningen UR as preferred supplier of research

In the formal relationship between the Ministry of LNV and Wageningen University and Research Centre, three categories of research are described and fall within the domain of public responsibility and will receive state financing:

a) Knowledge Base (*Kennisbasis*)
Research in this domain is considered essential to preserve research expertise and research facilities in important scientific disciplines

b) Statutory Research Activities (*Wettelijke Onderzoekstaken*)
Especially in the areas of food safety, veterinary science, phytosanitary knowledge and others, the state has legal obligations to conduct research and maintain a high level of expertise

c) Policy Supporting Research (*Beleidsondersteunend Onderzoek*)
The remainder of the research budget can then be dedicated to research, which supports the Government's policy plans. This implies that the political course chosen has its consequences for priority setting. Policy supporting research provides input into the policy development process (scenario studies, feasibility studies, etc.), but can also consist of research considered important in bringing about previously defined policy goals. Organic agriculture for a large part falls in this category

Initiation of policy supporting research activities to be conducted by the Ministry's preferred supplier Wageningen-UR is an annual formalised process in which the Ministry of LNV takes the lead. This process is laid down in a ministerial decree[2]. Before May 1 of each year, the Ministry sends a *Kaderbrief Onderzoek* (Letter of general orientations, or 'framework letter') to Wageningen-UR. This *Kaderbrief* broadly states:

1) the policy themes that require (new) programme activities in the following calendar year

2) the tariff and normalised cost structure for the following year

For organic agriculture, as well as for other policy themes, input into the *Kaderbrief*, is the result of a consultative process, usually through dedicated one-day conferences, in which stakeholders and Ministry officials discuss how research activitities, as well as farm advisory work and education activities, can and should contribute to the intended growth of the organic sector.
The political identity of the Dutch coalition Government, and the partisan and personal views of the Minister of Agriculture play a role as well.

The *Kaderbrief* provides an indication of the subsidies available in the next year, as well as applicable financial or other preconditions. The *Kaderbrief* provides for each cluster of agricultural research, ten in total for 2006, the available budget. For organic agriculture this is a little more than 6 million EUR.
On the basis of the broad guidelines of the *Kaderbrief* Terms of Reference (*Programma van Eisen*) are written for each theme. This takes place in close collaboration between Wageningen UR and the Ministry as main 'client' of the research products. The Ministry, in particular the Cluster Organic Agriculture, will take the initiative in the area of organic agriculture.

[2] Regeling (Decree) subsidie Stichting Dienst Landbouwkundig Onderzoek, Staatscourant 1999, nr. 65 d.d. 6 april 1999, in force since 1 January 1999.

The next logical step is that in early autumn the Terms of Reference are the input to a more binding letter of orientations, which is sent to Wageningen-UR, accompanied by the respective budgets, inviting the institution to present concrete proposals for new programmes and projects.
The Cluster Board Organic Agriculture, in coordination with Wageningen UR, will allocate the available budget to the new themes that are relevant, as well as to themes of ongoing research, where there is a need to adjust certain aspects.

6.2 Stakeholder engagement

Coordinator of the process of formulating research questions and organising stakeholder engagement is the sectoral organization Biologica in which all primary and most secondary stakeholders are represented. Biologica coordinates a whole structure of working groups, Bioconnect (see chapter 2), at different levels, to ultimately provide the Ministry with a prioritised list of research themes.

The Bioconnect *Netwerkloketten* are the main tool to extract research ideas and criterias for prioritisation from the stakeholders. Primary and secondary stakeholders discuss ideas, problems and possible solutions with researchers, which can lead to new research proposals. Since Bioconnect only started functioning in 2005, there is no experience yet to draw conclusions on the efficacy of this initiation, prioritisation and control. However, a structure for a successful stakeholder engagement is present.

Before 2005, Biologica, receiving its input directly from experts and stakeholders in the organic sector, regularly presented a list with subjects that needed (extra) research to the ministry of LNV. Many of the recommended subjects were adopted in the policy documents.

6.3 The Ministry as facilitator and as client of research

The final say on which research proposals go ahead is also with the Ministry of Agriculture. As was referred to in the introductory part of Chapter 3, the Ministry has two roles. The Ministry sees itself as facilitator of the intended growth of the organic agriculture sector, this being the policy objective. Through the process described, the organic sector stakeholders propose research themes. The stakeholders generally know best, and their proposals will be taken very seriously and are mostly adopted by the Ministry.
The second role of the Ministry of LNV is to develop, monitor and evaluate its own policies. The Ministry has legal obligations. It is, for instance, the 'competent authority' in the framework of Regulation EC 2092/91. The Ministry represents Dutch interests at the European Commission and the European Council. It supervises the Dutch certification body Skal. Regularly, these different responsibilities require knowledge input from stakeholders of the organic agriculture sector. An advisory structure is in place for this. Sometimes one concludes that certain research activities are needed to answer specific problems.
For these kinds of activities, the Ministry has autonomy in commissioning Wageningen UR research institutions to produce the required information. In all research programmes decided in the process described above, a maximum of ten percent of the budget is set aside and earmarked for ad-hoc research questions including policy relevant questions.

6.4 Open calls

Sometimes open calls are made. Wageningen UR institutes as well as other institutions, which do not have a link with the Ministry, can respond with their proposals. Here, until now, no fixed dates apply.
Based on (policy/political) needs, research needs are defined for a topic. After an inventory of the state of the art of knowledge and research, the Ministry decides whether new research is necessary. If affirmative, at least three institutions are requested to send in a proposal for a project based on well-defined terms of reference elaborated by the Ministry.
The project proposals are comparatively evaluated and the best one (based on price and quality) is chosen and funded.

7 Selection criteria and evaluation procedures

Identification of organic agricultural research priorities takes place in a process as described elsewhere in this country report. The process of selection of research areas and specific projects, which is bottom-up, still needs to comply with a sort of tender documents, based on specific and relevant terms of reference, guarantees that no additional selection criteria need to apply.
An evaluation procedure before the final approval of the project is a further safeguard.

As regards evaluation, as is shown in figure 1, Bioconnect will also play an important role. Since Bioconnect only commenced her activities in mid-2005, for the time being evaluation procedures will be the same as for other (non-organic) research programmes.

The standard 'ex-ante evaluation' in which third party subject matter specialists and representatives of the Ministry of LNV follow a defined procedure to ascertain that the programme's objectives and intentions are realistic.
Secondly, each programme is supervised by a supervisory committee, which accompanies the programme's work plan, formally assesses the annual planning and progress. The supervisory committee can include stakeholders, farmers, farm advisors, governmental experts and researchers not involved in this particular programme.
Finally, after conclusion of the programme, it is evaluated in a standard 'ex-post evaluation' to assess whether and to what extend the programme's goals were achieved. The evaluation committee is made up of specialists and stakeholders, who sat in the supervisory committee, ideally supplemented by others who can look at the programme with a fresh view.
For the evaluations a three page questionnaire exists. As a rule, researchers involved in the programme are excluded from the evaluation.

The evaluation that takes place before a research programme is approved, consists of the following analysis, undertaken by before mentioned committee of subject matter specialists and Ministry officials.
After finalisation of the programme, the 'ex post' evaluation basically focuses on the same issues and uses the same criteria.

The following issues are debated and clarified in both evaluation rounds.

1. A judgement on the quality of the report of the full research programme:
   Focus points are completeness of the report, are all aspects addressed and are descriptions sufficiently clear and comprehensible?
   A grade point is assigned to this aspect, on a scale from 1 to 5.

2. Evidence in the programme of the relevance to society as a whole:
   Focus points are the link between research and policy development and current political issues, relevant policy themes of the Ministry of Agriculture, Nature and Food Quality, impact in the wider society, objectives of ministerial policy in relation to the (agro) business community, and flexibility in response to new developments (if relevant).
   To what extent does programme outcome contribute to ministerial policy objectives and are knowledge issues pertinent to these objectives being addressed?
   Can you name some examples to demonstrate relevance to society as a whole?
   Please assign a grade point to this aspect, on a scale from 1 to 5.

3. How did generated knowledge flow to target groups and problem owners and how was it taken up?
   Here the issue is effect and use of knowledge in policy development, policy implementation, policy support, etc. The relevance of this is not limited to policy makers at this Ministry. Use of research outcome by other public authorities, civic societies, product-marketing boards and other research programmes are relevant too.

4. Criteria are:
   - There is a clear communication plan to stimulate flow and implementation of knowledge
   - Use of generated knowledge can be demonstrated in palpable products like for example policy papers, practical field situations, etc.
   - Programme and project leaders coordinated progress with the relevant problem owners. Debriefing or exit interviews at conclusion of projects are standard
   - Research results are laid down in accessible policy relevant summaries. If need be, this was contracted out
   - Project en programme information was easily accessible, for example through the internet
   - Members of the supervisory committee, in particular the chairperson and the secretary, were active in dissemination of research results and had a role as contact point for their colleagues

   Please assign a grade point to this aspect, on a scale from 1 to 5.

5. What is your judgment on the quality of the output of the research programme:
   At stake here is the quality of delivered results. Were they the correct answer to the question, are they timely, is their description clear and concise, are they useful?
   More in particular, the considerations here are:
   - Were research and communication targets met?
   - Are the products well described?
   - Are alterations to the programme well explained?
   - Were projects well in tune with each other? Were intermediate results integrated in a dynamic and continuous update of the projects?
   - Is there a succinct description of each project with its timeframe, projected output, milestones and results?
   - What is your prognosis on the usefulness of the programme's results?

   Please assign a grade point to this aspect, on a scale from 1 to 5.

6. What is your judgement on the organisation and management of the programme?
   This item refers to organisation and work methodology of the research programme, planned internal communication and coordination, as well as cooperation.
   Criteria include, but are not limited to, quality management, transparency of communications both internal and external towards clients and supervisory committee, flexibility to adapt to new developments, balance between short and long term results, clear and transparent procedure for non-earmarked financial resources, aspects of co-financing of other programmes and projects, concrete cooperation with other research programmes, an coaching by supervisory committee's chairperson and secretary of the other members of the committee.
   Please assign a grade point to this aspect, on a scale from 1 to 5.

7. What is your judgment on the input into the research programme?
   This item deals with the effective and efficient use of available resources. The criteria include effective use of money, good budgetary balance between short-term and long-term projects, transparency in projects expenditure and contributions from third parties, timely consultation on differences between planned and realised application of resources and clear reporting on these.
   Please assign a grade point to this aspect, on a scale from 1 to 5.

8 Utilisation of research

Knowledge dissemination is integrated in most Dutch publicly funded research projects. For this purpose all research programmes and many of the underlying projects contain a special paragraph on communication. It describes, which publications other than research reports are produced and which dissemination activities are planned and for which target groups.
Knowledge adoption by the final users of the newly generated knowledge, however, is not the responsibility of research and therefore organised separately. It is intended that Bioconnect will eventually also initiate and coordinate these extension activities. This only applies for activities executed in projects with a common interest for the sector and/or government. Individual advice is a private and therefore commercial activity beyond the scope of Bioconnect.
Recently new activities have started on dissemination of organic research information to the education sector. It is expected that Bioconnect will also play an advisory role in this new education network.

9 Scientific education and research schools

In the Netherlands, various options exist for post-secondary academic training in organic agriculture. All are concentrated at Wageningen University and Research Centre.
Wageningen University offers a complete curriculum "Organic Agriculture", which is broadly oriented on the supply chain (production - processing - trade – consumption) as well as on disciplines (technique, economy, society and environment). The curriculum is problem-oriented and assumes an integrated approach of the total (farm) system.
There is a BSc programme, conducted in Dutch language, *Biologische Productiewetenschappen*, (Organic Production Sciences).
This can be followed by a two year (or less) international MSc programme, conducted in English, with a choice of two major subjects:

- *Farm and Rural Environment*
- *Consumer and Market*

In addition, Wageningen UR offers qualified applicants four-year PhD programmes, including in organic agriculture.

Annex 1 Glossary and terms

Ministerie van Landbouw, Natuur en Voedselkwaliteit = Ministerie van LNV = LNV	Ministry of Agriculture, Nature and Food Quality
Biologica	Organisation; main policy platform of the Dutch organic sector, representing primary producers, traders and processors, and natural food stores. Member of IFOAM
Knowledge Network Organic Sector = Bioconnect	Kennisnetwerk Biologische Landbouw; tiered private structure integrating all agricultural sectors and stakeholders, responsible for defining the sector's research needs.
Cluster Board on Organic Agriculture	Organisational entity within the Ministry of LNV, dealing with all issues of 'knowledge' in organic agriculture.
Netwerkloketten (Network Counters).	Primary tier within Bioconnect, where inputs from within an agricultural sector come together, and, generally, sectoral matters are discussed.
Adviescommissie Kennis (Advisory Committee Knowledge)	Secondary tier within Bioconnect, fed by the respective Network Counters, making final recommendations to the Ministry of LNV on research projects and their priorities.

CORE Organic Country Report

Country Report on Organic Farming Research in Norway

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Photographer: Reidun Pommeresche, Bioforsk Organic Food and Farming Division

Country Report for Norway, February 2006

Content

1. History

The growth of Organic Food and Farming

In 1986, only 19 farms in Norway were certified for organic production. Initiatives in the 1990s encouraged many farmers to convert and the number of organic farms increased from 423 in 1991 to 2,486 in 2005 (statistics: www.debio.no). In the same period, the area of organically certified farmland and land in conversion increased from 2,443 ha to 43,034 ha, about 3.5 % of the total farmland.

In 1999, the government put up a specific goal for the development of organic farming, stating that 10 % of the agricultural land shall be managed according to organic standards within 2010 (White Paper from the Ministry of Agriculture,[1] 1999). However, a pre-requisite for this goal is that the demand for organic products increases in accordance with the increasing production. According to the White Paper, organic farming methods contribute to food safety, greater product diversity, environmental benefits, sustainability and enhanced farm incomes. In October 2005, Norway elected a new government that has declared to strengthen the public goals for organic agriculture, as well as the public resources to research. The new aim is that 15 % of the Norwegian food production and 15 % of the food consumption shall be organic within 2015. In order to achieve the 10 %-goal by 2010, about 1,250 farmers have to convert to organic farming annually during the next four years. This number comprises 2 % of the present conventional farmers. However, the need for farmers to convert is even higher, since approx. 200 organic farmers annually have reverted from certified organic production during the last few years. Research is regarded as one important means to increase the volume of Organic Food and Farming (OF&F).

Several ideological sub-groups participate in the OF&F movement, e.g. biodynamic farmers, Adventists and others. In Norway, as in most other countries, some disagreements have occurred, but in general, the groups within the organic movement have been cooperating and the movement is commonly regarded as a unity. There is for example only one body to certify and one label to define organic produce. The label is a green Ø ("Økologisk" means Organic), and biodynamic products receive the Demeter label in addition (Figure 1).

Figure 1. The label to identify organic products in Norway is a green "Ø", the first letter of the word "ecological" in Norwegian. Biodynamic products additionally receive the Demeter label.

The first OF&F research

The research in organic farming in Norway started with MSc theses work by students at the Agricultural University of Norway (now: Norwegian University of Life Sciences, UMB) at the end of the 1970s.

Public research funding for OF&F was first provided in 1985, when the Research Council of Norway (at that time, The Norwegian Research Council of Agricultural Science, NLVF) funded a project focussing on nutrient supply in organic dairy farming. The project was carried out by the Norwegian Crop Research Institute (since January 1, 2006: Bioforsk Norwegian Institute of Agricultural and Environmental Research). Public funding for OF&F research was regarded as an important milestone among stakeholders within the organic movement. The project granting was

[1] The title of the White Paper: Stortingsmelding 19 (1999-2000). Om norsk landbruk og matproduksjon (About Norwegian agriculture and food production). The Royal Ministry of Agriculture, 161 p.

seen as a result of the efforts and enthusiasm of organic pioneer farmers in Mid-Norway, who had established the first advisory service within organic farming in 1980. In 1985, the first course in organic farming methods was established at the Agricultural University of Norway (now UMB). In 1986, the Norwegian Centre for Ecological Agriculture (NORSØK) was founded, with the aim of developing organic farming in Norway. Since January 1, 2006, NORSØK is included in Bioforsk as the Organic Food and Farming Division.

An important step forward in Norwegian OF&F research was an extensive whole farm case study project (1989-1997) funded by the Agricultural Agreement Research Fund (AA-funding, see chapter 4). The project produced results demonstrating the agronomic and economic performance of organic farming and studied the social challenges linked to this change in agricultural practice. The project also introduced organic farming in regions of the country where it was still very rare. A range of research institutions, farmers and agricultural advisers participated, which coordinated by NORSØK.

A research programme for OF&F was carried out by RCN (NLVF) during 1992 -1996, with a total funding of approx. € 2.2 million. Since then, OF&F research has competed with general OF&F research for funding in RCN programmes. AA-funding has funded a range of OF&F research projects since 1989, and in 2004, research funding was created by a small tax on agricultural products, Levy funding was for the first time used to support OF&F projects (see chapter 4). In line with the increasing project funding, several research institutes, universities and other organisations have allocated their own economic resources and labour to OF&F research. Thematically, plant production, crop protection and animal husbandry were the focus areas of the first decade of OF&F research, as will be discussed in later chapters.

Present strategies

To increase organic production and achieve the official aims, the Ministry of Agriculture and Food (until 2004: the Ministry of Agriculture) has developed a national policy specifically targeting organic farming. This is described in the action plan *Prioritised Areas within the Food- and Agricultural Research*, which is linked to the White Paper of 1999. Organic farming is one out of seven topics to be prioritised for research funding. For this farming method, the Ministry considers the following needs to be of greatest importance: To reduce various biological and economical risks linked to production; to increase the diversity and quality of organic products in the market and the general knowledge of organic markets and consumers; and to increase the knowledge of the whole value chain from production via processing to distribution of organic produce. An Action Plan for Organic Production and Sales launched by the Norwegian Agricultural Authority (SLF) in 2000, and revised in 2003, states that a range of organisations and stakeholders should feel responsible for contributing towards reaching the official aims. The RCN should have a coordinating role and cover all areas of organic research. Over the years, the main funding sources for OF&F research (the RCN, AA-funding and Levy funding, see Chapter 4) have become increasingly coordinated. For all research projects funded by these bodies, the RCN is responsible for the proposal procedures and quality control. However, the use of funds is decided upon by discussions between the individual funding boards. The funding for a specific project is often composed of contributions from more than one funding body.

In later years, the government has paid more attention and devoted relatively more resources to OF&F development projects than to research projects. Market development has been regarded as the crucial task, in order to increase the demand for organic products. The Norwegian Agricultural Authority (SLF) administrates approx. € 5 million per year of public funding for development projects within the OF&F sector (38 mill. NOK in 2005 and 2006). SLF projects are not described in this report.

It is challenging to draw a clear line between OF&F development and research projects, but in this report we have chosen to define OF&F research projects as the projects funded by the three funding bodies mentioned above (the RCN, AA-funding and Levy funding).

Norway is a large country with a small and scattered population (4.4 million). The regional research within OF&F is usually of limited scientific value at an international level.

Timeline for Norwegian research in Organic Food and Farming

Table 1. Timeline for development and research in Organic Food and Farming in Norway 1981-2005

1977 Research in organic farming was initiated by students as a part of their MSc theses at the Norwegian University of Life Sciences, UMB (at that time: the Agricultural University of Norway)

1981 The Research Council of Norway, RCN (at that time: the Norwegian Research Council of Agricultural Science - NLVF) appointed a committee to describe the status, research needs and future potential for organic farming in Norway. A report was delivered in 1983

1985 The first organic research project was funded by the RCN (NLVF)

1985 UMB started education in organic farming methods

1987 The first public funding was given to Norwegian Centre for Ecological Agriculture, NORSØK (now Bioforsk Organic Food and Farming Division)

1988 Whole farm case studies were initiated by the Agricultural Agreement Research Fund

1990 Economic support for conversion to organic farming and to organic production introduced by the Ministry of Agriculture

1991 An RCN (NLVF)-appointed committee suggested future research within OF&F

1992 First research programme on OF&F was launched by the RCN (NLVF)

1994 Organic farming was officially approved as a part of the EEA-agreement (European Economic Area)

1997 NORSØK was approved as research institute and national centre of competence

1998 Professorship in agroecology, including organic farming, was established at UMB

1999 Official goal of 10 % organically managed farmland within 2010, declared in White Paper by the Ministry of Agriculture

2000 The first Action Plan for Organic Farming was launched by Norwegian Agricultural Authority (SLF)

2003 SLF action plan revised, more emphasis on market development

2004 An RCN-appointed committee suggested priorities for future research within OF&F

2005 The largest milk company, TINE, decided that 4 % of their milk sales shall be from organic milk within 2010

2005 The new elected government declared that 15 % of the Norwegian food production and consumption shall be organic within 2015

2006 Bioforsk Norwegian Institute of Agricultural and Environmental Research was established as a fusion between the Norwegian Crop Research Institute, the Norwegian Centre for Soil and Environmental Research, and NORSØK. Bioforsk Organic Food and Farming Division is the responsible unit for the OF&F research within Bioforsk.

2. Organisation

Research activities, participants

The Norwegian Crop Research Institute (NCRI) and the Norwegian Centre for Ecological Agriculture (NORSØK) were the main actors within OF&F research in Norway in the period from 1985-2005. After these institutes merged with the Norwegian Centre for Soil and Environmental Research (Jordforsk) to form Bioforsk, they aimed to be a central part of the future agronomic research in OF&F. Bioforsk has seven research divisions, which consist of one or several departments located in various regions of the country (more at www.bioforsk.no). The employees at Jordforsk have been transferred to the Bioforsk Soil and Environment Division. The employees at NORSØK have been transferred to Bioforsk Organic Food and Farming Division, which is the responsible unit for the OF&F research within Bioforsk. NORSØK continues to exist as a foundation with the aim of developing organic agriculture in Norway.

The Norwegian University of Life Sciences, UMB (until 2004: the Agricultural University of Norway) conducts several OF&F research projects, and offers an international master programme in agro ecology which covers organic farming. This programme has been developed through Nordic collaboration in the Nordic School of Agroecology/Ecological Agriculture (AGROASIS, **http://www.agroasis.org/**) under the NOVA University Network. The NOVA University Network is a cooperation between the agricultural, forestry and veterinary universities in Denmark, Sweden, Finland, Iceland and Norway.

In a period with shrinking enrolment to university studies in agriculture, this programme attracts more students every year, and in 2005, 21 students from 11 different countries were participating.

Hedmark University College also conducts OF&F projects and offers a bachelor study in organic farming.

The Norwegian Agricultural Extension Service (LFR- Landbrukets forsøksringer) is owned and governed by 28,500 active farmers. The service body has 83 regional extension groups covering all of Norway, out of which 17 focus on organic agriculture. Hence, all districts in Norway offer professional consulting in both organic and conventional farming, and the extension service is cooperating as one big system with local ownership, but central oversight. This organisation is a very central research disseminator, and has been involved in some OF&F research projects as well (see chapter 3).

Several other research institutes and universities are also involved in OF&F research. The most active research, teaching and extension institutions within OF&F are represented in a board called "The Research Panel for Ecological Agriculture", listed in table 2. Some other universities and research institutes (the University of Tromsø, the Norwegian University of Science and Technology, the University of Oslo and the Norwegian Institute for Urban and Regional Research) have also been responsible for research projects in OF&F, but do not participate in the panel.

Table 2. Overview of Norwegian research institutions participating in the research panel for ecological agriculture. H = head, M = member, D= deputy, S = secretary. The listed persons may be used as contacts for Organic Food and Farming within their institutions.

Name of institution	Acronym, web address
Bioforsk Arable Crops Division	www.bioforsk.no
Bioforsk Organic Food and Farming Division	www.bioforsk.no
Norwegian University of Life Sciences	UMB, www.umb.no

Hedmark University College	HIHM, www.hihm.no
National Veterinary Institute	NVI, www.vetinst.no
Norwegian School of Veterinary Science	NVH, www.veths.no
Norwegian Agricultural Economics Research Institute	NILF, www.nilf.no
Bioforsk Soil and Environment Division	Jordforsk, www.bioforsk.no
National Institute for Consumer Research	SIFO, www.sifo.no
Western Norway Research Institute	WNRI, www.vestlandsforskning.no
Centre for Rural Research	CRR, www.bygdeforskning.no
Norwegian Agricultural Extension Service	LFR, www.lfr.no

Stakeholder organisations

All the above-mentioned research institutions have participated in the public debate on OF&F and aim at a prolonged activity within this sector. Other important stakeholder organisations are partly public authority bodies and partly NGO's.

Public authority bodies

* The Ministry of Agriculture, since 2005 called the Ministry of Agriculture and Food (MAF), actively supports organic farming to achieve the 15 %-goal.

* Agricultural county authorities administrate some public support to OF&F in their county. Furthermore, they participate in the public debate especially at a regional level and carry out development projects within OF&F in cooperation or competition with other organisations.

* The Research Council of Norway (RCN) is responsible for research related to food and farming in general, on behalf of the MAF, who provides the major funding resources within this sector to RCN. Food and farming research is considered as an important means to accomplish the goals of the agricultural policy.

* The Norwegian Agricultural Authority (SLF) administrates public support to organic (and conventional) farmers and official funding for development projects within OF&F. The annual amount of funding for extension, information, marketing and national pilot projects is € 5 million.

* The Advisory Board for Organic Agricultural Production, established and headed by the MAF, contributes to the achievement of the 15 %-goal. The Board gives advice to the Government and other decision making bodies, the farmers' organisations and other major stakeholders on topics of principal interest and relations that are essential for the further development of organic production and sale. The Board gives advice during revisions of the Action Plan for Organic Agriculture (see chapter 1) and it is responsible for ensuring that the development instruments are used in an efficient way. The board shall contribute to increased coordination and cooperation between the institutions and stakeholders that are involved in the development of OF&F. The Norwegian Agricultural Authority is the general office for the Advisory Board. The institutions participating in the Advisory Board are the Ministry of Agriculture and Food, Norwegian Farmers' Union, OIKOS (see below), Debio (see below), Norwegian Food Safety Authority, Research Council of Norway, Innovation Norway, agricultural county authorities, Federation of Norwegian Food and

Drink Industry (NBL), Federation of Meat Industry (KIFF), Coop and Federation of Norwegian Commercial and Service Enterprises (HSH).

Non-governmental organisations

* Oikos is a membership organisation with approximately 1,400 members, founded in the year 2000 to support the visions and principles of organic farming and strengthen the organic movement in Norway. The members are both producers and consumers of organic commodities. Oikos publishes the journal "Ren mat" (Pure Food) six times per year and "Grobladet" (the Herbal Magazine) four times per year.

* Debio is a membership organisation for organisations and enterprises active within organic agricultural production, processing and consumption. The organisation has been legislated to ensure that all production, processing and sales of organic food are carried out according to the national standards. It has also been assured the right to certify biodynamic production and issue the Demeter label (Fig. 1). The national standards for OF&F are governed by the EU standards for organic agriculture.

* The Biodynamic association has 370 members. The main task is to increase the knowledge of this farming method, by seminars, advice to farmers and trainees and cooperation with other stakeholders within OF&F. The association cooperates with Debio to certify biodynamic farming. The journal "Herba" is published by the association four times per year.

Oikos, Debio, the Biodynamic association and Bioforsk Organic Food and Farming Division have regular meetings to exchange information and facilitate cooperation.

* The Norwegian Farmers' Union (NB) wants to promote increased sustainability of agriculture and welcomes organic agriculture as a reference for an environmentally sound way of production, as well as a way to increase agronomic knowledge. The Union supports a national production of organic commodities that covers the consumers' demands, for products adapted to Norwegian production conditions. NB has its own production quality assessment and documentation system ("Kvalitetssikring i landbruket", KSL) and would like the Debio certification system and KSL to become integrated for organic farmers. The Union's opinion is that premium prices, rather than public economic support, shall ensure an equal profit for organic and conventional farmers. In later years, the Union has focussed on the demand for increased production of organic cereals and vegetables.

* The Norwegian Farmers' and Smallholders' Union (NBS) has traditionally been closer allied to the organic movement than the Farmers' Union has been. This reflects some ideological resemblance. The opinion of NBS on organic agriculture is that this farming system represents a highly developed agronomic competence. More focus on organic food will strengthen the competence and consciousness of consumers about food production in general. Hence, a successful priority setting for organic farming may be fruitful for small-scale farming in general and efforts to increase the sales of organic produce are considered as useful.

* Environmental NGO's

Several NGO's are active in Norway. In general, they are positive to organic farming, and most of them are members of the legislation body Debio (see above), as well as of the "Network for Food and Environment" '(see below). Even so, the cooperation between the environmental and organic movement has not been too extensive. A possible explanation is that organic farming has to compete with other topics that cause even more enthusiasm in the environmental movement.

* Consumer NGO's

Consumer NGO's are less developed in Norway than in many other countries, but the Norwegian Women and Family Association has worked actively for many years to promote organic food and food safety. There are also several networks and bodies established by environmental organisations that work to promote sustainable and organic food and non-food products, such as "Green Daily"

(the authors' translation of "Grønn hverdag") and "Network for Food and Environment". These organisations work to inform consumers and influence authorities to achieve a more sustainable everyday life.

3. Mapping research programmes

Background

Significant amounts of public funding have been used for OF&F research in Norway since 1990. All research projects and programmes presented here, have in common that RCN has been/is the funding body, or the research administrator for other funding bodies. The projects described were financed by various RCN programmes, AA-funding, and since 2004, Levy funding (see chapter 4 for definitions). Much of the research activity has also been partly financed by the basic funding of the research institutions. The amount this funding comprises is very difficult to calculate. As opposed to the situation in some other European countries, the budgets of Norwegian research projects include working costs.

Only in the period 1992-1996, there was a separate RCN programme for OF&F research. Thereafter, OF&F projects have been competing with general agricultural research for funding. On behalf of the RCN, Skutlaberg (2004) produced a list of ongoing research projects within OF&F in February 2004[2], with an appendix of projects that were completed by 2004. The projects presented in this country report are based on the work by Skutlaberg, with an addition of three projects that were granted in late 2004. In 2005, no projects within OF&F were granted. Hence, by January 2006, the Skutlaberg-overview plus three projects from 2004 represents the total overview of OF&F research projects since 1990, funded by the RCN or by funding bodies for which the RCN was the research administrator. A joint targeted call for OF&F research proposals will be launched by the RCN and AA-funding in April 2006.

Summarising the research activities, it has not always been possible to draw a clear line between OF&F and other agricultural research. Projects included in the figures below have in certain cases contributed significantly to OF&F as well as to general food and farming.

Research 1990-2005

Key figures

Most relevant RCN programmes for OF&F research:
Research Programme for Organic Farming (1992-1996)
Soil and Plants (1997-1999)
Soil, Plants and Livestock (2000-2005)
Market and Society (2000-2005)
Strategic Institute Programmes

Additional funding from AA-funding and Levy funding

Number of projects: 96, out of these three were granted in 2004

Total funding: Approximately € 24 million in the period 1990-2009 (see tables 3, 4)

[2] Skutlaberg, A. 2004: Økologisk landbruk. Liste over igangværende prosjekter 2004-2007. Utarbeidet på oppdrag fra Norges forskningsråd. (Organic agriculture. List of ongoing projects 2004-2007. Written as a commision from RCN.) 28 p.

Research programmes

For the period 1992-1996, an RCN research programme was devoted to organic farming with a total funding of approx. € 1.75 million. Since 1996, OF&F projects have been included in the general research programmes for agriculture. From 2000 to 2006, the main part of the OF&F research activities was financed by the RCN research programmes "Soil, Plants and Livestock" (2000-2005) and "Market and Society" (2000-2005), in addition to strategic institute programmes (see below). Ongoing OF&F projects from these programmes will take their future funding from either the "Norwegian Food from Sea and Land" (2006-2011) or the "Area and Nature-based Industrial Development" (2006-2011), see below.

Throughout the whole period, AA-funding has funded significant amounts of research within OF&F. In 2004, the Board of Directors for Levy funding for the first time decided to co-fund two OF&F projects, with a total spending of € 1.3 million for the period 2005-2009.

In addition to the RCN research programmes, AA- funding and Levy funding, an instrument called strategic institute programmes has been important within OF&F research. Such programmes were/are organised in "Strategic Institute Programmes" (1994-2005) and "Strategic Programmes for Research Institutes related to Primary Industry" (SIP-PRIM, 2006- open). The resources for Strategic Programmes were raised by a decrease in the basic funding to all research institutes in 1994. The financial resources are managed by the RCN and the proposal procedure for such programmes is the same as for research project proposals. Strategic programmes are especially devoted to strengthen the scientific competence of the participating institutes and one or more doctoral fellows are usually employed. The following Strategic Programmes have been especially important for OF&F research during the period 1991-2005: "Nutrient supply to organic farming systems with small amounts of animal manure" (1998-2003), "Mineral content in plants and mineral supply for ruminants in organic agriculture" (2000-2006), "Crop protection in organic farming" (1998-2002), "Animal health in organic farming" (1998-2003) and "Organic cropping systems for higher and more stable cereal yields" (2003-2007).

Research areas and projects

A total funding of approx. € 10.8 million was spent on OF&F research projects, which were initiated and completed between 1990 and 2003 (Table 3). Crop and animal husbandry were the most focussed subjects, followed by studies of farming systems. Environmental issues were generally integrated into projects on other topics, such as farming systems. Hence, there are no activities listed solely under the subject area environmental aspects. The total funding for research projects, which were running or granted in 2004, comprises approx. € 13.5 million. Out of these € 13.5 million, € 5.5 million were used before 2004. All running projects in 2004 were initiated in 2000 or later (three in 2000, three in 2001, seven in 2002 and four in 2003). An exact distribution of the € 5.5 million for each of the years 2000-03 has not been available, so the best approximation is that 5.5/4 = € 1.375 million were used in each of the years 2000-2003, divided between subject areas as indicated in table 4.

Table 3. Distribution of project funding in the period 1990-2003 according to subject areas of Organic Eprints, for OF&F projects that were completed in 2004. Farming= Farming systems, Animal = Animal husbandry, Crop = Crop husbandry, Environ= Environmental aspects, Food = Food systems, Values = Values, standards and certification, KnowMan =Knowledge and management.

Subj/Year	90	91	92	93	94	95	96	97	98	99	00	01	02	03	Total, 1000 €
Farming					285	295	295	167	292	250	250	125			1959
Animal					118	137	137	240	291	349	343	323	323	162	2423
Crop			25	35	187	198	194	44	246	382	629	629	521	340	3430
Soil	2	3	3	3	33	35	27	53	310	310	343	293	293	17	1725
Environ															
Food								91	146	214	274	219	94	58	1096
Values															
KnowMan	7	40	40	60	20	2	4								173
TOTAL	9	43	68	98	643	668	659	595	1285	1506	1726	1477	1232	577	10806

Table 4. Distribution of project funding in the period 2004-2009 by subject areas, for OF&F projects which were running or granted in 2004. Abbreviations of subject areas are shown in table 3.

Subj/Year	Before 2004	2004	2005	2006	2007	2008	2009	Total, 1000 €
Farming								
Animal	333	398	344	306	63			1444
Crop	4086	2013	1325	1022	744	156		9346
Soil	797	284	164	84				1329
Environ								
Food			63	213	213	213	175	877
Values								
KnowMan	255	149	81					485
TOTAL	5471	2844	1977	1625	1020	369	175	13481

Participating researchers and institutes

All universities, institutes and other organisations that were responsible for one or more of the projects listed in tables 3 and 4 are listed in tables 5 and 6.

Table 5. Private institutes and organisations responsible for OF&F research in Norway between 1991and 2005.

Institution	Number of projects
Gilde Norwegian Meat (Northern Norway Sales Company (NNS))	1
The Norwegian Agricultural Purchasing and Marketing Cooperative (Felleskjøpet) (Dept. East-West, Div. Holstad)	1
Norwegian Gardener's Union (NGF)	1
Bioskiva A/S (private company producing plant protection agents from dried manure)	1
The Norwegian Agricultural Extension Service (LFR) Div. Middle Telemark Div. East Norway Agricultural Centre, group fruit and berries Div. Øko-Søn, advisory service for organic farmers in South-Eastern Norway	 3 1 1
The Royal Norwegian Society for Development (RNSD)	1

Table 6. Universities and national research institutes responsible for OF&F research in Norway between 1991 and 2005. Since January 2006, NCRI and NORSØK have merged into Bioforsk.

Institution	Number of projects
The Norwegian Crop Research Institute (NCRI)	
Div. Research Centre Apelsvoll	12
Dep. Løken	1
Div. Research Centre Kvithamar	5
Div. Research Centre Holt	2
Div. Research Centre Crop protection	9
Div. Research Centre Ullensvang	1
Norwegian Centre for Ecological Agriculture, NORSØK	9
Norwegian University of Life Sciences (UMB)	2
(until 2004: the Agricultural University of Norway)	
Departments (by their names in 2005):	
Animal and Aqua Cultural Sciences	3
Plant and Environmental Sciences	8
Chemistry, Biotechnology and Food Science	1
Mathematical Sciences and Technology	2
Economics and Resource Management	1
Norwegian School of Veterinary Science (NVHS)	3
National Veterinary Institute (NVI)	3
University of Tromsø (UiT), Dep. of Biology	2
The Norwegian University of Science and Technology (NTNU)	
Dep. of Social Anthropology	1
Dep. of Geography	1
University of Oslo (UiO), Dep. of Nutrition	1
National Institute for Consumer Research (SIFO)	2
Norwegian Agricultural Economics Research Institute (NILF)	2
Western Norway Research Institute (WNRI)	1
Centre for Rural Research (CRR)	1
Norwegian Institute for Urban and Regional Research (NIBR)	5

Distribution of funding within research institutions

The Norwegian Crop Research Institute (NCRI) received the largest amount of funding during the period 1990-2004 (Figure 2) and it has also received the major part of the research funding for projects that were still running or granted in 2004 (Figure 3). The Norwegian Centre for Ecological Agriculture (NORSØK) and the University of Life Sciences (UMB) received funding that was roughly comparable with that of NCRI until 2003 (Figure 2). Thereafter, the funding to NCRI for OF&F projects has been much higher than for any other research institute.

The veterinary institutions (NVH in the first and NVI in the second period) and the Norwegian Agricultural Economics Research (NILF) have received some funding both before and after 2004. Other social science institutions, such as the National Institute for Consumer Research (SIFO), the Western Norway Research Institute (WNRI), the Centre for Rural Research (CRR) and the Norwegian Institute for Urban and Regional Research (NIBR), received funding for OF&F research during the period 1997-2003 only (Table 3, Food systems).

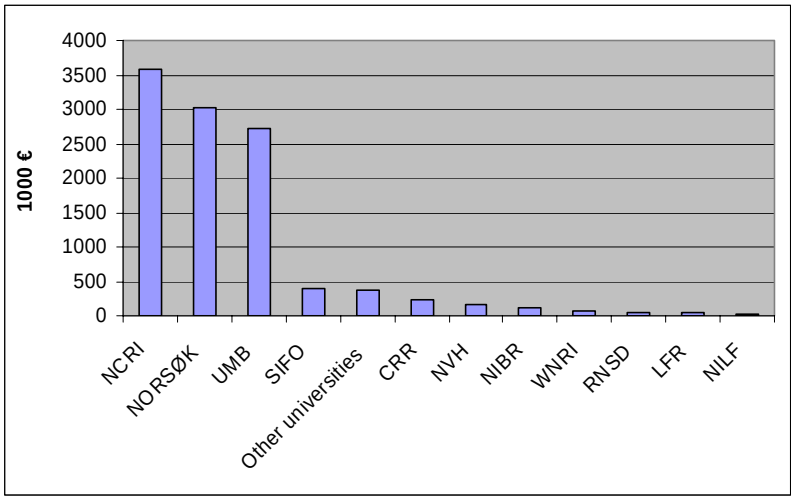

Figure 2. Distribution of the total project funding among research institutions during the period 1990-2003, for projects, which were completed by 2004. The acronyms are explained in tables 5 and 6.

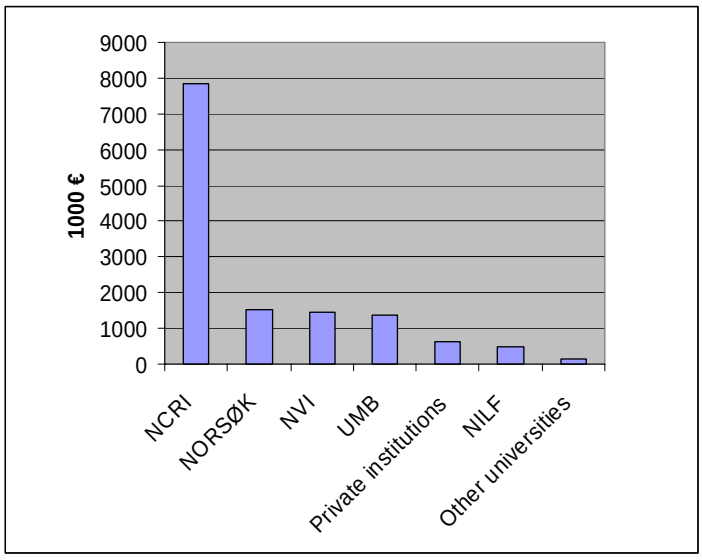

Figure 3. Distribution of the total project funding among research institutions, for projects, which were running or granted in 2004. The acronyms are explained in tables 5 and 6.

Research 2006-2011

From 2006 and onwards, the main RCN programmes that will fund OF&F research are "Norwegian Food from Sea and Land" (2006-2011) and "Area and Nature-based Industrial Development" (2006-2011). Some funding may also come from other RCN programmes. The Food Research Programme focuses on the total food chain from fork to farm/fjord. Thematically, the Food Research Programme covers all kinds of food production, including seafood, but the first part of the value chain for aquacultured species is treated in another programme (Aquaculture). The Area Programme supports research that is required to utilise the land and coast based resources for economic purposes other than production of food or forest. It also concentrates on research about trade policy (WTO etc.) and scientific support to regional and national policies. Most projects that are funded within these programmes have to be partially funded by a commercial user (e.g. industry, farmers' organisation etc). The annual economic funding for the Area Programme is approximately € 5 million, and for the Food Programme, € 16-20 million.

For the first call of these programmes (September 1, 2005) a total of 159 proposals were submitted; 89 to the Food Programme and 70 to the Area Programme. Total costs comprised almost € 24 million, whereas the available funds for new projects in 2006 were approx. € 5 million in the Food Programme and € 2.5 million in the Area Programme. In addition, € 2 million from AA- and Levy funding was coordinated with the Food Programme and € 0.75 million from AA-funding was coordinated with the Area Programme. AA-funding may be used as part funding from a private user in research projects of general interest, if a commercial user is difficult to find. More information about this is found in chapter 4.

An earmarking of funds for OF&F research has so far only been made for AA-funding, and comprises € 2 million for 2006. However, the RCN and the AA-funding board have recently decided to launch a joint targeted call for OF&F research proposals in April 2006.

4. Financing

Three main funding bodies

Significant research activity within OF&F has been partly financed by the basic funding of the research institutions, but this activity is not described below.

Three main funding bodies finance the research in OF&F described in this report:

- The Research Council of Norway (RCN)
- The Agricultural Agreement Research Fund (AA-funding), which is a research funding scheme established through an agreement between the farmers' organizations and the government
- The Foundation for Research Levy on Agricultural Products (Levy funding), which is created by a small tax on agricultural products

Below, the financing and management of these funding bodies is described.

RCN

The programmes of the RCN have been described in chapter 3. The financial resources of the RCN are determined annually by the state budget. RCN receives its funding for food and farming research from the Ministry of Agriculture and Food (MAF) (Food- and Area Programmes), The Ministry of Fisheries and Coastal Affairs (Food- and Area Programmes), The Ministry of Trade and Industry (Food Programme), and the Ministry of Health and Care Services (Food Programme). Organic projects must compete with general agricultural research for funding. Research within food and farming is carried out in close cooperation with commercial or public users (e.g. industry, farmers' organisation etc).

AA-funding

The Agricultural Agreement Research Fund (AA-funding) has been an important source of funding for many OF&F research projects. On average, AA-funding comprises approximately € 4.5 million per year in total. Annual negotiations between the government and the farmers' organisations settle the size of AA-funding and the amount allocated to OF&F research. Applied collective research on topics of importance for the agricultural sector is of special interest to AA-funding. Over the years, AA-funding has become closer coordinated with RCN funding. The two most important instruments of the RCN Food- and Area Programmes are "Knowledge-building Projects with User Involvement" (KIPs) and "User-led Innovation Projects" (UIPs). For these instruments, at least 20 % (KIPs) or 50 % (UIPs) of the budget must be co-funded by private users. In projects of general interest to all farmers, AA-funding (occasionally also Levy funding in KIPs) may be used to

cover the private contribution. The secretariat for the board of the AA-funding is with the Norwegian Agricultural Authority (SLF).

Levy funding

The Foundation for Research Levy on Agricultural Products (Levy funding) comprises approximately € 11 million per year. 0.3 % of the value of all national and imported agricultural products is paid as a levy to this fund, to ensure significant research within the agricultural sector. Agricultural products are defined as all products that are processed in some way to become food articles or natural stimulants. For processed imported products, the levy is 0.2 %. The distribution of funds for research projects shall approximately reflect the economical importance of the respective products. As mentioned for AA-funding, the Levy funding is closely coordinated with RCN agricultural programmes. For the first time in 2004, some Levy funding was used for OF&F research.

5. Research facilities

Background

In general, "organic" and "conventional" researchers in Norway cooperate well, which reduces the need for separate organic research facilities. There is also close cooperation between scientists and private farmers. An especially interesting example of such cooperation is located on one of the world's oldest biodynamic farms (converted in 1932) in Norway, which has been used as an object for several scientific studies. Some other long-term organic farmers, especially within the biodynamic sector, are also open to researchers and offer their farm as a study area. Still, organically managed research fields and herds are required. Especially within Bioforsk a range of such facilities are available, as almost all divisions and departments have some organically managed land (table 7). The future existence of research fields and other facilities is dependent on funding and the long-term availability of the research facilities described below is somewhat uncertain.

Experimental fields (organically managed)

Table 7. Area and year of conversion (YOC) available for OF&F research in Norway. YOC is defined as the year of conversion of the first fields on each location.

Institution, location	Area (ha)	YOC	Main crops
Bioforsk, Landvik*	3	1993	Vegetab.,seed
Bioforsk, Særheim	4	1998	Ley
Bioforsk, Kise	1.8	1998	Ley
Bioforsk, Apelsvoll**	12.4	1989	Cereals
Bioforsk, Løken	1	1991	Ley
Bioforsk, Sæter	1	1997	Ley
Bioforsk, Ullensvang	0.2	2000	Fruit: Plums
Bioforsk, Njøs	0.7	2000	Fruit, berries
Bioforsk, Kvithamar	4.3	1993	Cereals
Bioforsk, Tjøtta	10.2	1992	Ley
Bioforsk, Vågønes	106	2003	Ley

Bioforsk, Holt	4	1998	Ley
Bioforsk, Tingvoll	22	1986	Ley
Norwegian University of Life Sciences, Ås	15	1992	Ley, cereals
Hedmark University College, Hamar	16	1998	Cereals

*) The fields at Bioforsk, Landvik comprise 1 ha silty loam, YOC 1993, used for a crop rotation experiment in vegetables 2000-2006; 1 ha silty loam, YOC 1999, used for experiments with cereals and grass seed; 0.5 ha sandy soil, YOC 1999, used for grass seed and vegetables experiments and 0.9 ha sandy soil, YOC 2005, used for grass and clover seed experiments.

**) The fields at Bioforsk, Apelsvoll comprise 1.44 ha in the farming systems comparison experiment, YOC 1989 (see below); 1.5 ha managed as a diversified livestock system, YOC 1995; 2 ha for organic cereals, YOC 1997 and 7.5 ha for potatoes and cereals, rented land at Hoff, YOC 2000. All is morainic soil.

Long-term experiments

Farming systems comparison study, Bioforsk Arable Crops Division, Apelsvoll

A long-term farming systems comparison study was initiated at Bioforsk Arable Crops Division, Apelsvoll, in 1989. The aim was to compare on a model farm, level differences in yields, nutrient runoff, nutrient balances and economical results for conventional, integrated and organic dairy and cash crop farming systems. The vision of the project was to develop farming systems that minimise the runoff of nutrients and pesticide residues, produce healthy crops with optimal nutritional value and give satisfying yields and economic results. In 2000, the system was changed so that the term “integrated” was replaced by “optimal”, defined as the treatment that achieves the maximum yield per kilo leached nitrogen. The study comprises a field lysimeter with 12 plots, each 0.18 ha. Each plot is treated as a model farm, and six different farming systems (2 replicates per system) are compared as follows:

1. A reference cash crop farm with cereals and potatoes, managed as in the reference year of 1985
2. Optimal cash crop
3. Organic cash crop with 25 % land as green manure
4. Optimal cash crop with animal manure and 50 % ley
5. Organic mixed crop with 50 % ley
6. Organic mixed crop with 75 % ley

All model farms are managed with a 4-year crop rotation, where all crops are grown in each year (all plots are divided in four sub-plots).

Long-term study of cropping system for organic dairy farming, Bioforsk Grassland and Landscape Division, Kvithamar

Since 1993, 1 ha farmland has been managed as an organic dairy production unit, with purchased farmyard manure (FYM; dairy cow slurry). The crop rotation is designed for a herd size of one animal unit ha^{-1}, and the corresponding amount of manure is used in the experiment. The land is divided in four plots, which are tilled by normal size farm equipment in a four-year crop rotation comprised of 1) barley with undersown grass-clover ley, 2) and 3) ley and 4) mixed oats and peas. Yield levels and the nutrient content of soil and FYM are recorded regularly, and the earthworm population was studied in 1993, 1996 and 2000. As the soil here is heavy clay and conversion to organic farming practice caused a significant yield depression for several years, the experiment represents a nice example of development in yield levels after conversion.

Long-term study of organic stockless cash cropping system for organic vegetable production, Bioforsk Arable Crops Division, Landvik

Since 1993, one ha farmland has been used for a study of yield levels and agronomy in a stockless organic system with grass and clover seed production and vegetable growing. The nutrient supply has come from composted household waste and compost made from the plant residues produced in the experiment. The crop rotation has been wheat undersown with grass-clover ley, two years grass-clover ley for seed production and three years of cash-crops (potatoes, cabbage, lettuce, carrots). Yield levels and the nutrient content of soil are recorded regularly and the earthworm population was studied in 1993, 1996 and 2000. The experiment represents an interesting long-term series of yield records in a stockless cash crop system under Norwegian conditions.

Animal research facilities

Table 8. Organically managed herds on research farms. YOC is defined as the first year the herd was managed according to organic standards.

Institution, location	Type of herd	Feeding	YOC	Contact person
Norwegian University of Life Sciences (UMB), Ås	18 dairy cows	Individual	1995	
Bioforsk, Tjøtta	70 adult sheep	Group	1997	

Organic dairy herd at Norwegian University of Life Sciences (UMB)

Most organic dairy farmers in Norway have spring calving dairy cows and pasture based milk production, often due to the general poor quality of silage used for winter feeding. Hence, there is a need to increase the organic milk production in late autumn and winter. Recently, revised organic standards require that all feedstuffs to dairy cows should be organically produced, which also enhance the focus on improving the quality of on-farm produced roughages. The UMB has conducted the project “Milk production and quality and N use efficiency by dairy cows offered white or red clover silages”. White and red clover silages with and without concentrate supplementation are compared with respect to effects on milk production and quality, as well as N use efficiency. The experiment was carried out during the winter 2004/2005 and will be repeated in 2005/2006. In addition to DM intake and milk yield, the treatments effects on milk quality, including the content and composition of fatty acids and phyto-oestrogens, will be evaluated. The herd is otherwise managed according to organic standards.
A farm unit at UMB has been organically managed since 1991. The farm consists of 15 ha in rotation and six ha used for pasture and a dairy herd with 18 dairy cows (table 8). Due to a feeding experiment with dairy cows, the area and herd was temporarily expanded in 2002. The herd is kept in loose housing and fodder consumption is recorded continuously for each animal. The milk yield is recorded individually 14 times per week, and body weight is recorded at each milk yield.

Research farms

Currently, there are no research farms under any institute in Norway, nor private farm with a long-term research contract. However, several OF&F projects have been carried out on farm level with short-term contracts (3-5 years).

On-farm study

Organic dairy farm, Bioforsk Organic Food and Farming Division, Tingvoll

The farmland belonging to the Norwegian Centre for Ecological Agriculture (NORSØK), where Bioforsk Organic Food and Farming Division (BOFF) is located, is managed as a dairy farm with a herd of 13 dairy cows, 15 adult sheep and approx. 30 laying hens. 18 ha cultivated land and eight ha pastures have been organically managed since 1995, by tenants who own the livestock. Plots for research studies are rented from the tenants. For the commercial dairy farm, BOFF researchers conduct annual registrations of yields, in addition to regular soil sampling and estimation of nutrient budgets. A climatic logger station measures the local temperature and precipitation during the growing season. In total, this represents an interesting data material, where trends in productivity etc. are studied on a practical farm level.

Networks

There are currently no research networks in Norway, where farmers are communicating and research is carried out on their farms, except trials managed by the Norwegian Agricultural Extension Service (LFR, see chapter 2). Such trials have not been treated as research in the context of this report.

LFR is a very central research disseminator with 83 regional extension groups covering all Norway, out of which 17 aim at organic agriculture.

Leaching fields

In the farming system experiment at Apelsvoll described above, drainage and runoff is collected separately from each plot and analysed for N and P once every month. Runoff occurs only in months with heavy precipitation.

List of contact addresses

For convenience, we have listed all institutions active in OF&F research or education that is described in this report in table 9.

Table 9. Institutions active in research or education within Organic Food and Farming.

Name of institution, acronym	Address	Web-page
Bioforsk Norwegian Institute of Agricultural and Environmental Research	Fr.A. Dahlsvei 20 N-1432 Ås	www.bioforsk.no
Bioforsk Organic Food and Farming Division	Tingvoll gard N-6630 Tingvoll	www.bioforsk.no
Norwegian University of Life Sciences (UMB)	P.O. box 5033 N-1432 Ås	www.umb.no
Hedmark University College (HIHM)	Lærerskolealleen 1 N-2418 Elverum	www.hihm.no
National Veterinary Institute (NVI)	PO box 8156 Dep. N-0033 Oslo	www.vetinst.no
Norwegian School of Veterinary Science (NVH)	PO box 8146 Dep. N-0033 Oslo	www.veths.no
Norwegian Agricultural Economics Research Institute (NILF)	PO box 8024 Dep. N-0033 Oslo	www.nilf.no

National Institute for Consumer Research (SIFO)	PO box 4682 Nydalen 0405 Oslo	www.sifo.no
Western Norway Research Institute (WNRI)	PO box 163, N-6851 Sogndal	www.vestlandsforskning.no
Centre for Rural Research	Universitetssenteret Dragvoll N-7491 Trondheim	www.bygdeforskning.no
Norwegian Agricultural Extension Service (LFR)	Fr. A. Dahls vei 20 N-1432 Ås	www.lfr.no
Norwegian National School for Organic Farming and Gardening (SJH)	Sogn Jord-og Hagebruksskule N-5745 Aurland	www.sogn-j-h.vgs.no

6. Initiation of research and stakeholder engagement

(How are new research programmes initiated? Who are the stakeholders and how are they engaged? What are the tools used for exposing research needs of specific stakeholders and society in general? What are the national needs? National research strategies as optional enclosures)

Programme initiation, RCN

When the RCN launches a new programme, a thorough process is started to ensure that important stakeholders are involved. The view that research is an important means to achieve political goals pervades all strategies that are developed during such processes. Prior to the establishment of a programme, strategic discussions on future research visions and instruments are carried out between the RCN and Ministries, industry representatives, programme boards of ongoing programmes etc. Stakeholders of general food and farming research, as well as those with special interest and responsibility for OF&F, are involved (see below). In the establishment of the new Food- and Area Programmes (see chapter 3), a large board of members were working for approximately half a year to produce the goals of the programmes. Later, a smaller programme board was independently selected for each programme to represent the various users of the results from the research activities, such as producers, the processing industry, distributors and the authorities (Attachment 1).

Stakeholders with special interests in OF&F research were also included in the process. An RCN appointed group proposed future priorities for OF&F research, as presented in a report of October 2004, in Norwegian[3]. The report may be found in Organic Eprints. The advisory group was composed of farmers, extension services, processing industry, distributors and research institutions (Attachment 1). A draft of the report was discussed in a meeting with a range of stakeholders from the OF&F sector and many important changes were introduced. A central term in the report is "the product circle", implying that projects within OF&F research should focus on a broad part of the circle formed by production, processing, distribution, consumption and recycling back to the production field. Detailed priorities are given within four fields of research: external conditions such as public regulations and subsidies etc.; sustainability and ecosystem services; production and agronomy; as well as processing, distribution and the consumer. The report suggests an increased emphasis on social science.

[3] Prioriteringer av forskning på økologisk produksjon og omsetning. Rapport til Norges Forskningsråd avgitt 15.oktober 2004. (Priorities of research on organic production and distribution. Report to RCN, October 15, 2004). 28 p.

Programme initiation, AA-funding and Levy funding

These funding bodies do not design research programmes, but develop their research priorities in close cooperation with producers and food and farming related industry. The funding board of the AA-funding is made up by representatives of the Farmers' Union, the Farmers' and Smallholders' Union and MAF (Attachment 1). For Levy funding, this board is extended with representatives from the food industry, distributors, food industry branch organisations and the labour union (Attachment 1). The RCN has an observatory status. Since the size of AA-funding is negotiated annually between MAF and the farmers' organisations, priorities for OF&F research are usually also established annually, whereas the aims of the Levy funding are more general (see chapter 4).

National needs within OF&F

In this context, we have chosen to focus on the priorities expressed in the RCN Food- and Area Programmes and the most recent priorities from the AA- and Levy funding, which will be the main funding sources for OF&F research in near future.

The Food Programme

RCN has for several years, as well as for the near future, decided to integrate OF&F research in the general agricultural research programmes. Hence, the priorities for the general agricultural research are essential also for OF&F research.

In general, various public funding mechanisms are gradually becoming more coordinated. Several instruments focus on the cooperation between sectors, such as the industry and research (R&D) providers. The vision of the Food Programme is **"Competitive and innovative industries that supply Norwegian food for the future".** The value chain from consumer to primary production is a core wire in the programme, as is the aim to create synergies between research in the agricultural and sea food sectors. The green and blue sectors have previously been in separate programmes. It is an important objective for the programme to establish some user-led innovation projects and/or knowledge-building projects that cover the whole value chain from market to primary production and that cause a synergy between marine and agricultural food production. Important principle themes in the new programme are: market research; innovative and market-adjusted products and entrepreneurship; production technology, process technology and logistics; competitive production of raw materials; food-related health quality and quality of life; innovation in public sector/food administration. Organic production is mentioned under the principle theme "Competitive production of raw materials". Here, it is stated that "in order to strengthen the competitiveness, knowledge is required about optimal production systems and types of operations, **including organic production**, that safeguard health and welfare in production and that ensure safe and reliable food production". Important interdisciplinary themes across the principal themes will be competitive raw materials and industrial production, innovative products and processes, as well as food and health. It is a challenge, not only for the OF&F research sector, but for the general agronomic research sector in Norway, to utilise the possibilities that the Food Programme represents and adapt their research strategies to these priorities.

The CORE Organic ERA-NET is described in the programme, and the Food Programme is responsible for the follow-up in this ERA-NET. It is stated that "During the programme period (2006-2011), transnational calls for proposals for research in selected themes, where funds from the programme may be used, may be relevant."

More information is available in the programme plan, which can be found at

http://www.forskningsradet.no/servlet/Satellite?blobcol=urlvedleggfil&blobheader=application%2Fpdf&blobkey=id&blobtable=Vedlegg&blobwhere=1119339842529&cachecontrol=5%3A0%3A0+*%2F*%2F*&ssbinary=true

The annual economic funding for the Food Programme will be approximately € 16-20 million from 2006-2011.

The Area Programme

The Programme may be seen as a partner to the larger Food Programme, and the focus here is on non-food, non-timber and area-based productions. The main users of results from the research activities in this Programme are trade, industries and public authorities in fisheries and aquaculture, agriculture, reindeer breeding, forestry, tourism and travel. The vision is **"Increased wealth creation in the area-based and nature-based industries".** Two principle target areas of the Programme are 1) "Area resources, innovation and industrial development" and 2) "Industrial policy and public administration". Research priorities in target area 1) are: areas and landscapes as a commercial and industrial basis; innovation and industrial development; market research; organisation, and competence and management. Research priorities in target area 2) are: industrial policy in agriculture, reindeer breeding, fisheries and aquaculture; international framework conditions; area and environmental management; changes in the public sector. Organic farming is not explicitly discussed in the Programme, but it is targeted within the research topics. Of importance for OF&F in this Programme is the principle of sustainable management of natural resources, the focus on the value chain in area-based productions, the focus on topics related to social science and market studies, as well as scientific support to policy development within aqua- and agriculture and other area-based trades.

More information is available in the programme plan, which can be found at
http://www.forskningsradet.no/servlet/BlobServer?blobcol=urlvedleggfil&blobheader=application%2Fpdf&blobkey=id&blobtable=Vedlegg&blobwhere=1119339842829

The annual economic funding for the Area programme will be approximately € 5 million from 2006-2011.

AA- and Levy funding priorities

These bodies have a common list of prioritised goals:

1. Exploit Norwegian natural resources for animal husbandry and crop production
2. Value creation in food production – new products or products with increased quality, demanded by the industry or consumers
3. Increased efficiency of agriculture, production methods, equipment, machinery, housing, etc.
4. Sustainable development and confidence in Norwegian food, food safety, animal welfare, environment, nutrition and health.

In 2006, the most central priorities are food safety, -quality and health, especially linked to bio-hazards, product innovation, cost reduction and animal welfare. For organic farming in particular, research that may support an increased demand for organic products is important. Furthermore, documentation of the effects of organic farming on society will be prioritised.

7. Selection criteria and evaluation procedures

The evaluation and selection process for project proposals is comparable for all three funding bodies, but different instruments are evaluated according to different assessment criteria. All researcher proposals are evaluated by two independent referees on the basis of the following criteria (score 1-7, with personal comments): national priorities, scientific quality, relevance for the food industry, ongoing "world class" research/ skill of contractor, relevance according to the call, the realism of the research, the chances of achieving the objectives, value for money/ the cost of the

work, enhancing collaborative research, potential to be included in EU's Framework Programmes, and international networking. The evaluation criteria for Knowledgebuilding Projects with user involvement (KIPs) and User-led Innovation Projects (UIPs) are different and to some extent more restricted. KIP-criteria are as follows: general project quality; research content; scientific merit; international collaboration; commercial relevance; relevance to enabling technologies; the environment, ethics and equal opportunity; relevance relative to the call for proposals. For UIPs the following applies: general project quality; degree of innovation; research content; international cooperation; economic value; socio-economic utility value; risk; additionality; the environment, ethics and equal opportunity; relevance relative to the call for proposals. The three funding bodies emphasise that all research shall be of ethically high standard, environmentally sustainable and bear no offence with respect to gender equality. There is no system to ensure that proposed OF&F research projects are based on research methods specially designed for this farming system.

Because of the evaluation procedures and to emphasise the significance of international cooperation, all researcher project proposals and KIPs are written in English. UIP-proposals are in most cases evaluated by a panel of experts and may therefore be written in Norwegian. Based on the referee reports/panel discussions and considerations of which projects best fit the general aims of the RCN programme, the general and annual aims of the AA-funding and the general aims of the Levy funding, the programme or funding boards (see chapter 6) select projects for funding. The applicants receive a copy of the evaluation from the experts or panel along with the conclusions of the evaluation process from the Programme Committee (PC).

The proposal cannot be modified before the final decision of the Programme Committee/funding board. However, the PC may suggest modifications and provide funding, based on recommendations from the evaluators. Hence, proposals may be modified during contract negotiations.

The selected project proposals may be subjected to a minimum of contract negotiations before a contract is signed. Granted projects (Researcher and KIPs) provide an annual report of progress to the RCN, in which considerable deviations from the proposed project plan have to be explained. The report of progress has to be accepted before next year's budget is granted. Completed projects provide a final report. UIPs provide bi-annual reports (the second of these with a financial report) and a final report (also with financial report). All reports have to be accepted by the RCN.

8. Utilisation of research

Background

Norwegian farmers are generally well educated and informed. However, an increasing number of farmers commit extra work outside the farm, which makes it a challenge to catch their attention. Traditionally, the extension service has been comprehensive in Norway. In addition to the Norwegian Agricultural Extension Service (LFR), the dairy, meat and poultry industry have their own advisers, who visit the farmers regularly to discuss the production records and management details. Within the LFR, a separate system of extension bodies for organic agriculture has been developed (see chapter 2), covering the whole country. Some organic extension bodies are organised as separate institutions, whereas others are integrated in the general extension bodies. There are separate journals, arrangements and web pages for Organic Food and Farming. In addition, general agricultural knowledge dissemination systems also include OF&F. In this report, only the systems that are dedicated to OF&F are described.

Journals

Four Norwegian printed journals are entirely dedicated to OF&F. The journal "Økologisk landbruk", until 1993 called "Hummelposten", is published in cooperation by the network of organic extension groups within LFR. "Økologisk landbruk" means organic agriculture. The journal is published four times a year. The extension agents in LFR mostly write the papers, but the journal is also a common information channel for researchers.

The journal "Grobladet" (the Norwegian name of *Plantago major* L.) is published and produced by Oikos four times a year (see chapter 2). The target group is organic gardeners and producers of herbs, vegetables, fruit and berries. The journal is an information channel for researchers within OF&F.

Oikos also publishes the journal "Ren mat" (which means "pure food"), with six issues per year. This journal is meant for consumers and people generally interested in OF&F. The topics of the journal are sustainable food, environmental issues, politics etc. but not production oriented papers. Hence, "Ren mat" is not as important as a channel for research results as "Økologisk landbruk" and "Grobladet".

The quarterly journal "Herba", published by the biodynamic association (see chapter 2) welcomes research papers of interest for biodynamic food and farming.

The journal "Forskningsnytt om oekologisk lantbruk i Norden" is a cooperation between the OF&F research institutes in Sweden, Denmark, Finland, Iceland and Norway. The journal is published four times a year, and each issue has a thematic focus (e.g. local processing, genetic engineering). Papers may be written in Danish, Swedish, Norwegian or English. This journal is an important channel of dissemination of research results and to strengthen the contact between OF&F researchers in these countries.

Other written materials

In addition to papers in Norwegian and in international journals, the results of OF&F research are published in report series published by the most active research institutes (Bioforsk, HIHM). The proceedings of national seminars, as well as NJF seminars (see below) are important channels of information and are published in the report series of the responsible institution. Especially for farmers, Bioforsk Organic Food and Farming Division publish a series of leaflets on practical topics. There are technical books for agricultural colleges available on the conversion to organic agriculture, soil cultivation in organic agriculture and organic animal husbandry, where research results are described.

Advisory service

The Norwegian Agricultural Extension service, LFR (Landbrukets forsøksringer)

As mentioned in chapter 2, the Norwegian Agricultural Extension Service (LFR) has 83 regional extension groups covering all Norway, out of which 17 aim at organic agriculture. Further information in English may be found at www.lfr.no. In addition to the journal "Økologisk landbruk", the extension agents provide consultancy to interested farmers during the conversion process and afterwards, especially linked to mandatory plans for fertilisation on farm and field level. Research results are an important basis for such advice. The extension groups also arrange seminars, where researchers are commonly invited to present and discuss their results. During the growing season, farmers are invited to field visits on interesting farms, or to observe interesting research plots. Research plots managed by the extension agents are partly designed by the extension groups to study questions of interest to local farmers and partly designed by research institutes who conduct series of field experiments in various regions of the country.

Advisers linked to industry

Some of the advisers employed by the agricultural industry are very interested and well qualified in OF&F topics. Several courses have been held for the advisers especially in the largest dairy company, TINE. Such courses are an important channel of dissemination of OF&F research.

Meetings and conferences

A national congress in organic farming was arranged in Hamar in the county of Hedmark in 2000, 2002 and 2003 by the Hedmark University College in cooperation with NORSØK (now Bioforsk) and Norwegian Agricultural Authority (SLF), who supported the arrangements. 200-250 people have participated in the arrangement, which was combined with an exhibition of technical equipment etc. The future of this congress is for the time being uncertain.

Each year, Bioforsk arranges a series of meetings in various parts of the country commonly called "Crop meetings", where especially the Crop meeting for Eastern Norway usually has much focus and separate sessions for organic agriculture. More than 300 people usually participate in this meeting, mainly advisers, researchers, public officials and some farmers.

Bioforsk Organic Food and Farming Division arranges annually open days at the research farm in Tingvoll or elsewhere in the local area, to disseminate research results and knowledge about Organic Food and Farming, often in cooperation with the county agricultural authorities.

From 1982 to 2002 (except in 1995), a seminar called "Vossaseminaret" was arranged annually by a group of voluntarily people engaged in organic agriculture. Voss is located in the western part of Norway, close to Bergen. The tradition has been transformed to a new series of meetings arranged at the Norwegian National School for Organic Farming and Gardening, Sogn Jord-og Hagebruksskule (SJH), see below for details about the school. These seminars focus on ideology, science philosophy and global aspects of organic farming. At SJH, seminars have been arranged in 2003 and 2005, and a 3rd meeting is planned in 2007.

The Nordic Association of Agricultural Scientists (NJF) arranges interdisciplinary congresses for all members each fourth year, latest in Finland in 2003. On these congresses, the interest for Organic Food and Farming has been increasing and OF&F research receives much attention both in separate sessions and included in the general sessions. Further, NJF has arranged several interdisciplinary seminars on OF&F, the latest in 2005. The association has also arranged seminars on certain topics within organic agriculture, such as nutrient flows between agriculture and society. More information can be found at www.njf.nu . The association works to increase the contact between researchers and advisers in agriculture in the Nordic and Baltic countries.

Web pages

In addition to the information found on the web pages for the various research, extension and education institutions described in this report, the web page www.agropub.no contains a range of technical papers, as well as a news service about organic agriculture. Agropub is a cooperation between Bioforsk Organic Food and Farming Division and the publishing firm GAN.

9. Scientific education and research schools

High school level

Several high schools offer education in organic agriculture, but only one high school is fully organic. This is the Norwegian National School for Organic Farming and Gardening, Sogn Jord-og Hagebruksskule (SJH), which offers two years theoretical and practical education in OF&F. A good description in English is given at http://www.sogn-j-h.vgs.no . At SJH, the curriculum is centred on ecological agriculture and sustainable community development. The school is owned by the county of Sogn and Fjordane, but is officially recognized as the National School for Ecological Agriculture. Many foreign students have attended SJH on the understanding that Norwegian is the language of instruction. The school farm is managed ecologically (certified organic) and SJH is the only agricultural school in Norway, where the students follow the practical work throughout the whole growing season. The students receive the degree *Agronomist in Ecological Agriculture,* and are supposed to have the basis for managing an ecological farm and the foundation for responsibly managing natural resources in an ecologically sound fashion.

University level

Hedmark University College, Hamar offers a Bachelor study in "Organic Farming". The study focuses on environmentally sound production of food, with the slogan "Clean food and a clean environment". To refrain from agricultural chemical inputs is a challenge and more knowledge is required from the advisers as well as from the farmers. The study offers this kind of knowledge to both of these groups and the study is both theoretical and practical. The study may be prolonged to receive a Master degree at UMB (see below).

The Norwegian University of Life Sciences (UMB) offers an international two-year Master programme in "Agroecology", through Nordic collaboration in AGROASIS - the Nordic School of Agro ecology/Ecological Agriculture. The primary responsibilities of the school are the development and content of a Nordic educational programme (MSc, PhD) and a Nordic research and development programme. AGROASIS is a NOVA University Network project between:

- Norwegian University of Life Sciences (UMB) - Norway
- The Royal Veterinary and Agricultural University (KVL) - Denmark
- The Swedish University of Agricultural Sciences (SLU) - Sweden
- University of Helsinki (HU) - Finland
- Agricultural College of Hvanneyri (LBH) - Iceland

UMB conducted three Nordic PhD-courses on research methods in agroecology/organic agriculture, in 1995, 1996 and 1997. Since then, Norwegian students have had the possibility to participate in Nordic PhD-courses in organic farming/agroecology in Sweden or Denmark.

Annex 1. Overview of institutions participating in funding boards or report committee

Table 1. Institutions in the Boards of Directors of the research programme "Area and Nature-based Industrial Development" and "Norwegian Food from Sea and Land", managed by the Research Council of Norway.

Area Programme

Agricultural Authority of Hedmark County
Norwegian Hospitality Association (RBL)
Farmer
Norwegian Seafood Federation (FHL)
Innovation Norway
Nordland county Fishermens' Association
NORSKOG, members' association for forest owners
Norwegian Farmers' and Smallholders' Union
Norwegian Forest Owners' Association

Food Programme

Gilde Norsk Kjøtt BA, Norwegian farmers' meat cooperative
Gunnar Klo A/S, exporter of fish
The Norwegian Association of Wholesale Grocers (NCF)
Norwegian Food Safety Authority
The Federation of Norwegian Agricultural Cooperatives
Fisher
Norgesmøllene A/S, cereal mills
Innovation Norway
Norwegian Seafood Export Council

*Table 2. Institutions in the Board of Directors for the Foundation for Research Levy on Agricultural Products and the Board of Directors for the Agricultural Agreement Research Fund (marked by *).*

Ministry of Agriculture and Food*
The Norwegian Farmers' Union*
The Norwegian Farmers' and Smallholders' Union*
Federation of Norwegian Food and Drink Industry
The Norwegian Confederation of Trade Unions (LO)/
The Norwegian Food and Allied Workers Union (NNN)
Norwegian agricultural purchasing and marketing Co-Op
BAMA (distributor of fresh food)
Research Council of Norway, observatory status

Table 3. Members of the group responsible for the report "Priorities for Research within Organic Production and Sales", published in October 2004.

Person	Institution
Anne Kathrine Fossum, head	Agricultural Authority of Hedmark County
Eivind Brendehaug	Western Norway Research Institute
Ragnar Eltun	Norwegian Crop Research Institute
Astrid Nilsson	Norwegian Food Research Institute
Per Christian Rålm	OIKOS (see chapter 2)
Carl-Erik Semb	Norwegian Agricultural Authorities
Jens Strøm	BAMA (distributor of fresh food)
Ketil Valde	Norwegian Centre for Ecological Agriculture

CORE Organic Country Report

Swedish research in organic farming and food systems

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Photographer: Mats Gerentz

Table of Contents

1 History of organic farming research programmes in Sweden

During the 1980s and 1990s the organic farming movement went through a period of institutionalisation, which manifested itself both in agricultural policy and in research development. In the 1980s a major public debate on food and agriculture came up. Issues discussed included leaching of nutrients, unethical treatment of domestic animals and pesticide residues in food. At the same time societal costs of surplus production were getting higher and higher. The first funding of research in organic farming and "biological medicine" however, was started by the private Ekhaga Foundation in 1944.

The first triennial national research programme in organic farming was launched in 1996 (until 1998) by the Forestry and Agriculture Research Board (SJFR), later Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas)[1]. This programme was followed by research programmes for the years 1998 to 2000, 2001 to 2003 and 2004 to 2007.

The Swedish Board of Agriculture (SJV)[2] launched the first programme for applied research and development in organic primary production research in 1997.

In 2001 the Swedish government started to earmark funds of the Swedish University of Agricultural Sciences to launch a research programme "Ekoforsk" for applied research in order to solve bottlenecks in organic primary production.

In 2001 the Swedish Board of Agriculture (SJV) launched the first 'Action Plan for Organic Production 2005' to fulfil the political goals of organic farming in Sweden.

With an increasing political and economic importance of organic farming for Swedish farmers, the Swedish Farmers' Foundation for Agricultural Research (SLF), a levy board, has increasingly funded research projects in organic farming.

2 Organisation

Research is mainly conducted by researchers at the Swedish University of Agricultural Sciences (SLU) (see the diagrams in the chapter on Financing). The SLU departments of Soil Science, Ecology and Crop Production Science (now Crop Production Ecology), Entomology, Animal Nutrition and Management, Animal Breeding and Genetics, Animal Environment and Health, Agricultural Biosystems and Technology, Crop Science and Agricultural Research for Northern Sweden are conducting research . This research is mainly financed by the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) through the national programme for organic agricultural research. Furthermore SLU research is funded under the programme for applied research experimentation and development in organic farming, which is financed by the Swedish Board of Agriculture (SJV). Within the "Ekoforsk" Programme based at the Swedish University of Agricultural Sciences (SLU) university scientists are commonly cooperating with advisors connected to private and public extension service institutions and organisations.

[1] Formas, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning, is a governmental research-funding agency related to several ministries, the Ministry of Sustainable Development, the Ministry of Agriculture, Food and Consumer Affairs, and the Ministry of Education, Research and Culture, http://www.formas.se/

[2] The Swedish Board of Agriculture / Jordbruksverket is the Government's expert authority in the field of agricultural and food policy, and the authority responsible for the sectors agriculture, horticulture and reindeer husbandry. Its responsibility therefore includes monitoring, analysing and reporting to the Government on developments in these areas, and implementing policy decisions within its designated field of activities. http://www.sjv.se

Single research projects in the national Formas programme are also conducted at the universities of Uppsala, Göteborg and Stockholm and by the privately owned seed company Svalöf Weibull AB. The National Veterinary Institute (SVA) and the National Food Administration (SLV) are conducting research which is directly financed by the Swedish state.

2.1 Financing of research

The Swedish Government has allocated funds for research in organic farming and food systems in different research programmes with approximately € 6 million since 2001. The public financing of research is mainly administrated through three bodies;

1) the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) with two national programmes on organic agricultural and horticultural research (Formas I and Formas II) since 2000;

2) the Swedish Board of Agriculture (SJV), financing a yearly programme with applied research experiments and development projects related to organic farming and animal health, animal husbandry, horticulture and crop production science, and;

3) the Swedish University of Agricultural Sciences (SLU) which has earmarked funding for applied research in organic primary production systems (Ekoforsk I and Ekoforsk II).

The Government also allocates funding for research directly to the National Veterinary Institute (SVA) and to the National Food Administration (SLV). Each institution receives € 0.2 million annually for research on forage, on infections in nutrient circulation production systems and on food safety and nutritional aspects of organic foodstuffs.

The private Ekhaga Foundation finances organic farming research with up to € 0.5 million per year, depending on the interest revenues of the foundation. There is no specific programme published for the calls and applied research as well as more theoretically focused organic farming research are financed. The Swedish Farmers' Foundation for Agricultural Research (SLF) has no specific programme in organic farming research but finances an increasing share of organic farming research projects in different applied research areas, summing up to approximately € 1.5 million per year.

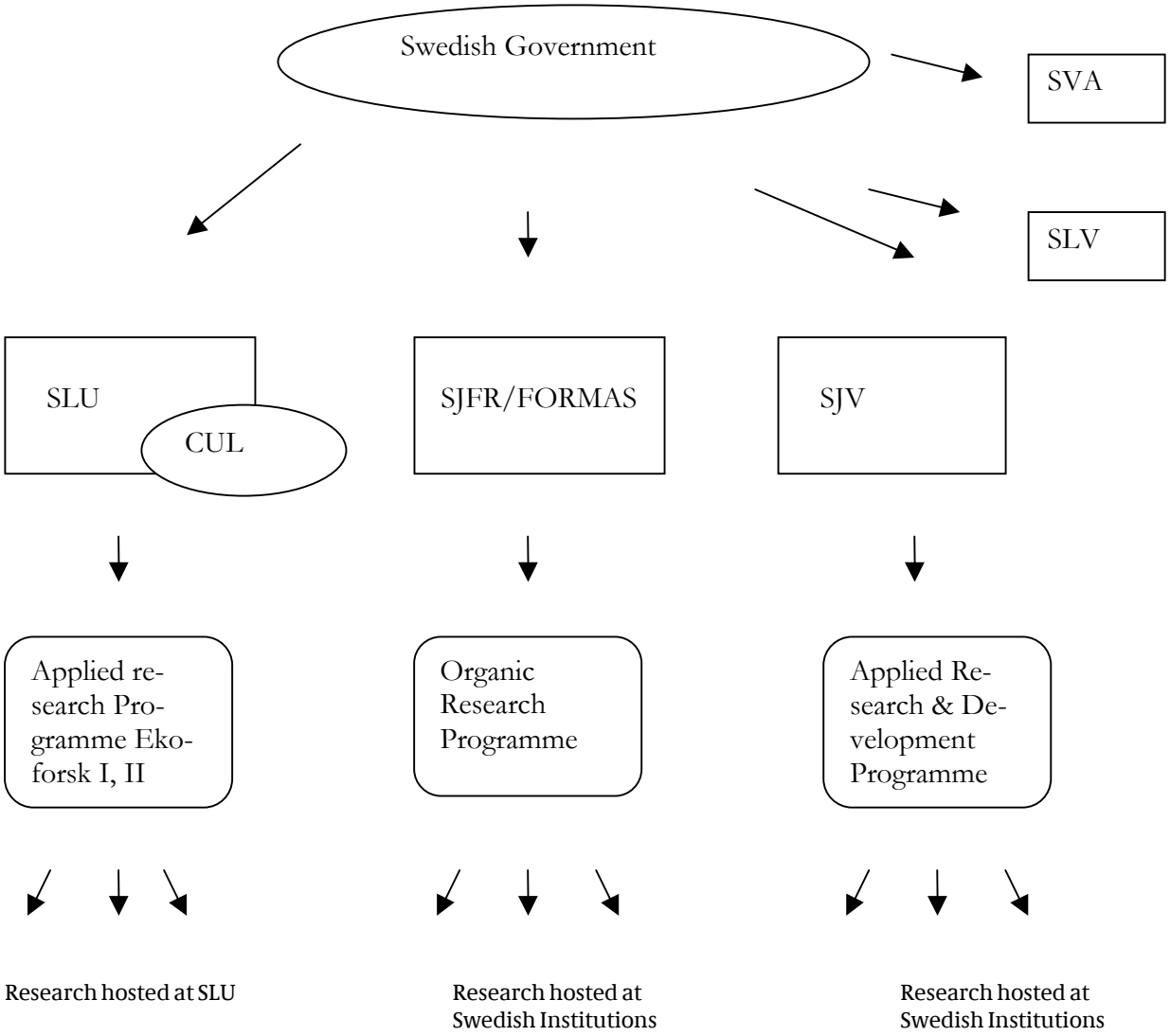

Figure 1: Main actors in national public research programmes on organic farming and food systems

2.2 Planning and coordinating of research

The Centre for Sustainable Agriculture (CUL) at the Swedish University of Agricultural Sciences (SLU) is coordinating the formulation of a triennial research programme. The stakeholders are involved in order to identify national needs. The main stakeholders and organisations, mainly also represented in the CUL reference group are:

- The Swedish Ecological Farmers Association
- Association of Swedish Growers (GRO)
- Federation of Swedish Farmers (LRF)
- Swedish Farmers' Foundation for Agricultural Research (SLF),
- Swedish Organisation of Leisure Gardening Societies(FOR)
- The Swedish Federation of Rural Economy and Agricultural Societies (HS)
- Swedish Board of Agriculture (SJV)
- Swedish Environmental Protection Agency(NV)
- National Food Administration (SLV)

- The National Veterinary Institute (SVA)
- Swedish Consumer Agency
- Swedish Cooperative Union, retailer representative
- Researchers active in major ecological and sustainability research programmes
- The Swedish Research Council for Environment, Agricultural Sciences and Spatial planning, Formas

The national programme for organic farm and food systems is financed by the Swedish Research Council for Environment, Agricultural Sciences and Spatial planning (Formas). It is coordinated by the Centre for Sustainable Agriculture (CUL), offering researchers and doctoral students a forum for seminars, workshops and communication support. CUL organises annual planning meetings as well as seminars and workshops for researchers and doctoral students. CUL is responsible for managing the research school "Swedish Research School for Organic Farming and Food Systems", SwOFF I and SwOFF II, which is open for doctoral students in the Formas financed projects.

3 Mapping research programmes

3.1 Introduction

National public funding of organic research is conducted in three different programmes through

(a) the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas, the Swedish partner in CORE Organic),

(b) the Swedish Board of Agriculture (SJV, research and development related to organic farming) and

(c) the Swedish University of Agricultural Sciences (SLU, the Ekoforsk Programme).

Apart from this, public funding of research is also directed directly to the National Food Administration, (SLV) and The National veterinary Institute (SVA).

Since 2001, Formas has funded two national programmes, on organic agricultural and horticultural research (Formas I and Formas II). The Swedish Board of Agriculture (SJV) is financing yearly programmes with applied research experiments and development projects related to organic farming and animal health, animal husbandry, horticulture and crop production science. The Swedish University of Agricultural Sciences (SLU) has also allocated funding for applied research in organic primary production systems (Ekoforsk I and Ekoforsk II).

Apart from the national programmes for funding organic farming research, private funding of research is carried out mainly by two actors: the Swedish Farmers' Foundation for Agricultural Research (SLF) and the Ekhaga Foundation.

3.2 Formas I: 2001 to 2003

In the spring of 2001 Formas received 69 million SEK[3] (=€ 7.6 million) from the government for a three-year research programme on organic agricultural and horticultural production. The programme ran from 2001 to 2003. Funds were distributed for 23 projects in the key action organic production.

[3] SEK = Swedish Krona

Key figures for Formas I

- *Title of programme:* Formas research programme regarding organic agricultural and horticultural production (Formas I)
- *Duration:* 2001–2003
- *Financing:* € 7.6 million in total over a three-year period
- *Number of participating universities, sector research institutes and private institutes:* 7
- *Number of projects:* 23

Participating universities and sector research institutes

- Halmstad University
- Linköping University
- Lund University
- Swedish University of Agricultural Sciences
- Uppsala University

Participating private institutes

- Svalöf Weibull AB
- Swedish Institute of Agricultural and Environmental Engineering

Financing

Table 1 Yearly average financing for Formas I over the period 2001 to 2003 divided into subject areas

Subject area	Projects	Amount 1 000 EUR	Amount 1 000 SEK
I Faming systems	–	–	–
II Animal husbandry	1–7	744.3	6 766
III Crop husbandry	8–15	883.2	8 029
IV Soil	16–21	387.5	3 523
V Environmental aspects	22	220.0	2 000
VI Food systems	-	–	–
VII Values, standards and certification	–	–	–
VIII Knowledge management	23	55.0	500
Total		2 290.0	20 818

Project numbers refer to the numbers in Annex 1; 1 SEK = 0.11 EUR

3.3 Formas II: 2004 to 2007

The programme is running from 1st July 2004 until 1st July 2007. As for Formas I, the Government set off funds for a three-year research programme regarding organic agricultural and horticultural production. The funds were distributed by Formas to 27 projects in the key action organic production.

Key figures for Formas II

- *Title of programme:* Formas research programme regarding organic agricultural and horticultural production (Formas II)
- *Duration:* 2004 to 2007 (a three-year period from 1 July 2004 to 1 July 2007)
- *Financing:* € 7 million in total over the period
- *Number of participating universities, sector research institutes and private institute: s*6
- *Number of projects:* 27

Participating universities and sector research institutes

- Göteborg University
- National Veterinary Institute
- Stockholm University
- Swedish University of Agricultural Sciences
- Uppsala University

Participating private institutes

- Svalöf Weibull AB

Financing

Table 2: Yearly average financing for Formas II over the period 2004 to 2007 divided into subject areas

Subject area	Projects	Amount 1 000 EUR	Amount 1 000 SEK
I Faming systems	1	69.3	630
II Animal husbandry	2–8	599.9	5 453
III Crop husbandry	9–18	886.3	8 056
IV Soil	19 –22	358	3 254
V Environmental aspects	23–25	281.5	2 559
VI Food systems	–	–	–
VII Values, standards and certification	–	–	–
VIII Knowledge management	26–27	141.1	1 283
Total		2 336.1	21 235

Project numbers refer to the numbers in Annex II, 1 SEK = 0.11 EUR

3.4 Programme of the Swedish Board of Agriculture (SJV): SJV 2000, 2001, 2002, 2003, 2004 and 2005

Each year the Swedish Board of Agriculture (SJV) distributes about € 1.4 million (13 million SEK) to applied research and development projects related to organic farming as well as animal health, animal husbandry, horticulture and crop production science. Projects within the yearly programmes can go on for several years but are funded one year at a time.

Key figures for the Programme of the Swedish Board of Agriculture (SJV)

- *Title of programme:* SJV (research and development related to organic farming)
- *Duration:* Yearly programme
- *Financing:* about € 1.4 million /year
- *Number of participating universities, sector research institutes and private institutes:* year 2000:7, year 2001:6, year 2002:5, year 2003:7, year 2004:9, year 2005:9
- *Number of projects:* year 2000:39, year 2001:30, year 2002:22, year 2003:37, year: 2004:37, year 2005:41

Table 3: Participating universities, sector research institutes and private institutes in research programmes financed by the Swedish Board of Agriculture (SJV) 2000–2005

	Participating universities and sector research institutes	**Participating private institutes**
SJV 2000	National Veterinary Institute Swedish Animal Health Service Swedish University of Agricultural Sciences	Svalöf Weibull AB Sweden's County Administration in Västmanland Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Jönköping, Kristianstad and Örebro
SJV 2001	National Veterinary Institute Swedish Animal Health Service Swedish University of Agricultural Sciences	Sweden's County Administration in Västmanland Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Jönköping, Kristianstad and Örebro
SJV 2002	National Veterinary Institute Swedish University of Agricultural Sciences	Sweden's County Administration in Västmanland Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Jönköping, Kristianstad and Örebro
SJV 2003	Halmstad University National Veterinary Institute Stockholm University Swedish University of Agricultural Sciences	Sweden's County Administration in Västmanland Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Jönköping, Kristianstad, Värmland, Örebro, Östergötland, and Landsbygdskonsult AB (AB is the ebbreviation of shareholding companies)
SJV 2004	Halmstad University National Veterinary Institute Stockholm University Swedish Animal Health Service Swedish University of Agricultural Sciences	Sweden's County Administration in Västmanland Swedish Dairy Association Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Jönköping, Kristianstad, Värmland, Örebro, Östergötland, and Landsbygdskonsult AB
SJV 2005	Halmstad University National Veterinary Institute Stockholm University Swedish Animal Health Service Swedish University of Agricultural Sciences	Sweden's County Administration in Västmanland Swedish Dairy Association Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Jönköping, Kristianstad, Värmland, Örebro, Östergötland, and Landsbygdskonsult AB

Financing

Table 4: Financing per year, divided into the two subject areas that are supported by the SJV programme

Subject area	SJV 2000		SJV 2001		SJV 2002		SJV 2003		SJV 2004		SJV 2005	
	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK
II Animal husbandry	910	8 270	412	3 745	346	3 146	240	2 181	308	2 803	281	2 551
Number of projects in area II	12		9		7		7		10		12	
III Crop husbandry	869	7 902	935	8 504	860	7 819	1 083	9 848	1 117	10 154	1 132	10 292
Number of projects in area III	27		21		15		30		27		29	
Total number of projects	39		30		22		37		37		41	
Total sum	**1 779**	**16 172**	**1 347**	**12 249**	**1 206**	**10 965**	**1 323**	**12 029**	**1 425**	**12 957**	**1 413**	**12 843**

1 SEK = 0.11 EUR

3.5 Ekoforsk I: 2002 to 2004

The Swedish University of Agricultural Sciences (SLU) funds the programme Ekoforsk, which deals with applied research in organic primary production systems. The programme supports researchers at the Swedish University of Agricultural Sciences with projects in organic farming. Cooperation with researchers and advisors outside SLU is, however, promoted and occurring. Ekoforsk I was initiated by SLU in 2002, and the goal was to increase the organic arable land in Sweden. The first programme finished in 2004.

Key figures for Ekoforsk I

- *Title of programme*: Ekoforsk I
- *Duration*: 2002–2004
- *Financing:* approximately € 0.9 million per year
- *Number of participating universities, sector research institutes and private institutes*: mainly 1 (SLU)
- *Number of projects:* 21

Participating universities and sector research institutes

Primarily the Swedish University of Agricultural Sciences (SLU) participates in this project, however cooperation with external researchers or other partners is promoted and occurs.

Financing

Table 5: Budget for Ekoforsk I presented in yearly average over the period 2002–2004 divided into subject areas

Subject area	Projects	Amount 1 000 EUR	Amount 1 000 SEK
I Faming systems	1–2	94.8	861
II Animal husbandry	3–4	46.4	422
III Crop husbandry	5–17	462.9	4 207
IV Soil	18	43.6	396
V Environmental aspects	–	–	–
VI Food systems	–	–	–
VII Values, standards and certification	–	–	–
VIII Knowledge management	19–21	209.4	1 904
Total		857.1	7 790

Project numbers refer to the numbers in Annex III; 1 SEK = 0.11 EUR

3.6 Ekoforsk II: 2005 to 2007

Ekoforsk II is the second programme funded by the Swedish University of Agricultural Sciences (SLU). The programme mainly supports researchers at the Swedish University of Agricultural Sciences with projects in organic farming. The programme deals with applied research in organic primary production systems and is running from 2005 to 2007.

Key figures for Ekoforsk II

- *Title of programme:* Ekoforsk II
- *Duration*: 2005–2007
- *Financing*: approximately € 0.8 million /year
- *Number of participating universities, sector research institutes and private institute*s: mainly 1 (SLU)
- *Number of projects*: 17

Participating universities and sector research institutes

Primarily the Swedish University of Agricultural Sciences participates in this programme, however cooperation with external researchers or other partners is promoted and occurs.

Financing

Table 6: Budget for Ekoforsk II presented in yearly average over the period 2005–2007 divided into subject areas

Subject area	Projects	Amount 1 000 EUR	Amount 1 000 SEK
I Faming systems	1	45.2	411
II Animal husbandry	2–5	251.2	2 283
III Crop husbandry	6–14	432.5	3 931
IV Soil	15–17	79.3	720
V Environmental aspects	–	–	–
VI Food systems	–	–	–
VII Values, standards and certification	–	–	–
VIII Knowledge management	–	–	–
Total		808.2	7 345

Project numbers refer to the numbers in Annex IV; 1 SEK = 0.11 EUR

3.7 Private funders – SLF 2000 to 2005

The Swedish Farmers' Foundation for Agricultural Research (SLF) funds different branches of agricultural research. Funds originate from tariffs placed on the selling price of agricultural products in different branches, plus taxes on nitrogen, P-fertiliser, cadmium and pesticides. They are allocated to research in the respective branches. The SLF funds research in 15 different areas: plant breeding, soil and plant science, horticulture, nutrient management and plant protection, potato production, sugar beet production, forage production, dairy production, meat production, poultry production, horse research, bioenergy, food market research, economic growth and business as well as occupational health and safety. There is no specific programme for organic farming, but substantial funds are distributed to research in organic farming according to the frame programme in the 15 different areas. Most of the projects deal with applied research in organic primary production systems.

Key figures for SLF (Private funding*)*

- *Title of programme:* SLF
- *Duration*: 2000 to 2005
- *Financing*: approximately € 1.5 million per year
- *Number of participating universities, sector research institutes and private institutes*: 9, but mainly 1 (SLU)
- *Number of projects*: 41

Participating universities and sector research institutes

Primarily the Swedish University of Agricultural Sciences participates in this programme; however other universities, sector research institutes and private institutes are involved (Table 7).

Table 7: Participating universities, sector research institutes and private institutes in research programmes financed by the Swedish Farmers' Foundation for Agricultural Research (SLF) 2000 to 2005

	Participating universities and sector research institutes	Participating private institutes
SLF **2000–2005**	Swedish University of Agricultural Sciences Halmstad University Göteborg University National Veterinary Institute	Swedish Institute of Agricultural and Environmental Engineering The Rural Economy and Agricultural Societies in: Skara and Örebro Swedish Dairy Association Swedish Beet Research

Financing

Table 8. Budget for SLF presented in yearly average over the period 2000–2005 divided into subject areas

Subject area	Projects	Amount 1 000 EUR	Amount 1 000 SEK
I Faming systems	1–5	187.0	1 700
II Animal husbandry	6–10	121.6	1 105
III Crop husbandry	11–32	927.7	8 432
IV Soil	–	–	–
V Environmental aspects	–	–	–
VI Food systems	33–38	162.3	1 475
VII Values, standards and certification	–	–	–
VIII Knowledge management	39–41	80.9	735.
Total		1 479.5	13 447

Project numbers refer to the numbers in Annex V , 1 SEK = 0.11 EUR

3.8 Private funders – Ekhaga Foundation

The private Ekhaga Foundation has financed organic farming research since 1944 with different amounts of funding. There is no specific programme formulated but the financing is according to the intentions of the founder of the foundation and strategic discussions in the evaluation committee.

Key figures for Ekhaga foundation

- *Title of programme:* Ekhaga foundation
- *Duration:* Yearly financing, private funding
- *Financing:* varies from € 165,000 to 445,000 per year
- *Number of participating universities, sector research institutes and private institutes:* year 2000:2, year 2001:4, year 2002:3, year 2003:2, year 2004:3, year 2005:2
- *Number of projects:* year 2000:14, year 2001:16, year 2002:7, year 2003:8, year: 2004:6, year 2005:5

Table 9. Participating universities, sector research institutes and private institutes in the research projects financed by the Ekhaga foundation 2000–2005

	Participating universities and sector research institutes	Participating private institutes
Ekhaga foundation 2000	Swedish University of Agricultural Sciences The Royal Veterinary and Agricultural University (Denmark)	–
Ekhaga foundation 2001	Swedish University of Agricultural Sciences	The Swedish Ecological Farmers Sweden's County Administration in Stockholm Applied Nutrition at the Stockholm County Council The Rural Economy and Agricultural Societies
Ekhaga foundation 2002	Swedish University of Agricultural Sciences	Biodynamic Research Association The Swedish Ecological Farmers
Ekhaga foundation 2003	Swedish University of Agricultural Sciences	The Swedish Ecological Farmers
Ekhaga foundation 2004	Swedish University of Agricultural Sciences The Royal Academy of Agriculture and Forestry	The Biodynamic Research Institute
Ekhaga foundation 2005	Swedish University of Agricultural Sciences The Royal Academy of Agriculture and Forestry	–

Table 10. Budget, presented in yearly average, and number of projects for the Ekhaga foundation over the period 2000–2005 divided into subject areas

Subject area	Ekhaga foundation 2000		Ekhaga foundation 2001		Ekhaga foundation 2002		Ekhaga foundation 2003		Ekhaga foundation 2004		Ekhaga foundation 2005	
	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK	Amount 1000 EUR	Amount 1000 SEK
I Farming systems	**67.4**	**613**	66	**600**	**60.5**	550	**74.8**	680	**55**	500	–	
Number of projects in area I	**3**		**3**		2		2		1		–	
II Animal husbandry	**43.3**	**394**	77	**700**	**55**	500	–		**33**	300	**71.5**	650
Number of projects in area II	**2**		**3**		1		–		1		2	
III Crop husbandry	166.1	**1°510**	195.3	**1°775.3**	**22**	200	**141.9**	1°290	**126.5**	1°150	**33**	300
Number of projects in area III	**6**		**6**		1		4		3		1	
IV Soil	–		–		–		–		–		**44**	400
Number of projects in area IV	–		–		–		–		–		1	
V Environmental aspects	–		77	**700**	**38.5**	**350**	–		–		–	

Number of projects in area V	–		**2**		**1**		–		–		–	
VI Food systems	14.5	**132**	5.5	**50**	**55**	**500**	–		**33**	300	–	
Number of projects in area VI	**1**		**1**		**1**		–		1		–	
VII Values, standards and certification	–		–		–		–		–		–	
Number of projects in area VII	–		–		–		–		–		–	
VIII Knowledge management	11.4	**104**	24.2	**220**	**14.3**	**130**	37.4	340	–		**16.5**	150
Number of projects in area VIII	**2**		**1**		**1**		2		–		1	
Total number of projects	**14**		**16**		**7**		7		6		5	
Total sum	302.7	**2 753**	445	**4 045.3**	245.3	**2 230**	**254.1**	2 310	**247.5**	2 250	**165**	1 500

1 SEK = 0.11 EUR

4 Financing

The main National Research Programme amounts to € 2.5 million per year. It is administrated by Formas and operates in accordance with government regulations and annual budget documents that regulate and establish the activities and budget for the coming year.

This is also true for the National Applied Research and Development Programme in Ecological Production. This programme has € 1.4 million per year, administrated by the Swedish Board of Agriculture (SJV). The Ekoforsk Programme at SLU, amounting to € 0.8 million per year, is regulated by the Swedish government through the annual budget document to SLU that regulates and establishes the activities and budget at the University. The document states the amount of funding that SLU should spend on the Ekoforsk Programme. The annual budget document also states that SLU should finance the activities of coordination, development and communication at CUL with € 0.5 million per year.

Table 11. Estimated annual funding for research and coordination in organic food and farming 1998–2005, Million Euro (million SEK).

	1998–2000	**2001–2003**	**2004**	**2005**
SJFR/Formas	1.6 (15)	2.3 (21)	2.2(20)	2.2(20)
SJV, Experimentation & development	1.8 (16)	1.3 (12)	1.4 (13)	1.4 (13)
SLU, Ekoforsk	-	0.9 (8)	0.9 (8)	0.8 (7)
SLU, CUL, Coordination & communication	-	0.5 (5)	0.5 (5)	0.5 (5)
SLV		0.2 (2)	0.2 (2)	0.2 (2)
SVA		0.5 (5)	0.2 (2)	0.2 (2)
Ekhaga Foundation (private)	0.3 (3)*	0.3 (3)	0.2 (2)	0.2 (2)
SLF, Swedish Farmers' Foundation for Agricultural Research (private)	1.5 (13)*	1.5 (13)	1.5 (13)	1.5 (13)
Total ca	5.2 (47)	7.6 (69)	7.4 (67)	7.3 (66)

*refers only to 2000. For distribution on subjects see chapter on Mapping research programmes)

Research according to institutions is presented below for the National Research Programme financed by Formas 2004 to 2007 with € 2.5 million per year, and for the National Research Experiments and Development Programme financed by The Swedish Board of Agriculture, SJV, with € 1.4 million per year. Research in the national Ekoforsk Programme administrated by the Swedish University of Agricultural Sciences (SLU) is always hosted by a SLU institution but cooperation with advisors and researchers mainly from private and public extension service institutions and organisations are promoted.

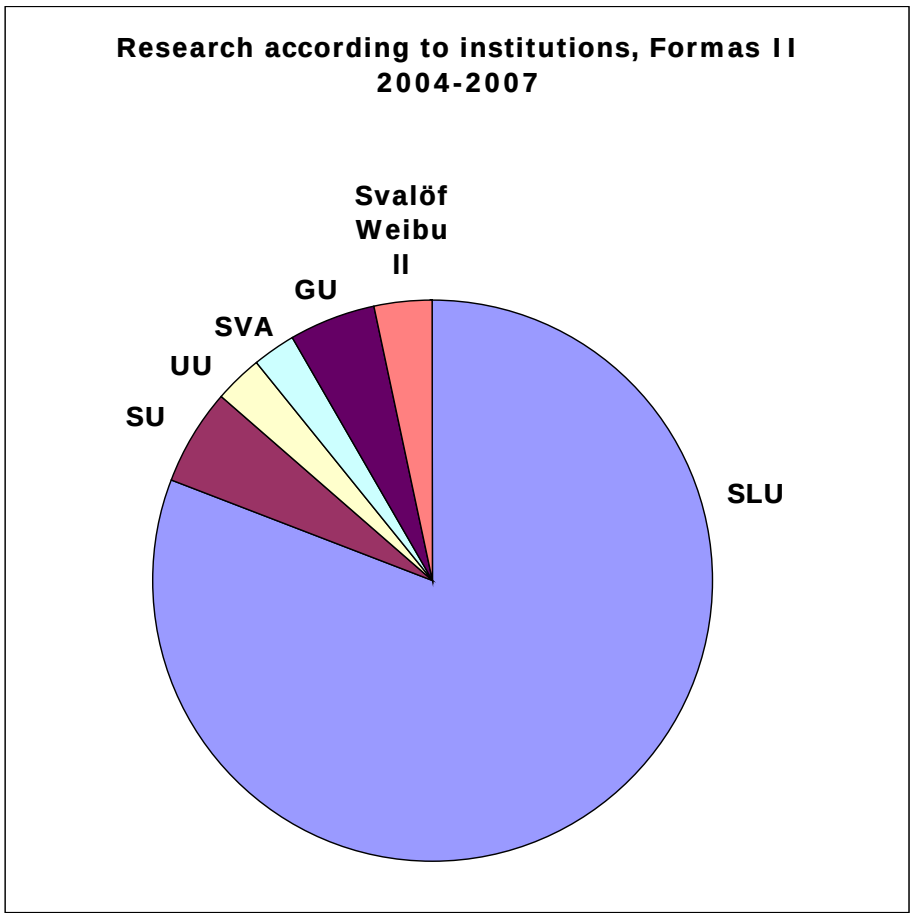

Figure 2. Research funding according to institutions in the Formas II national programme

For abbreviations see acronym list

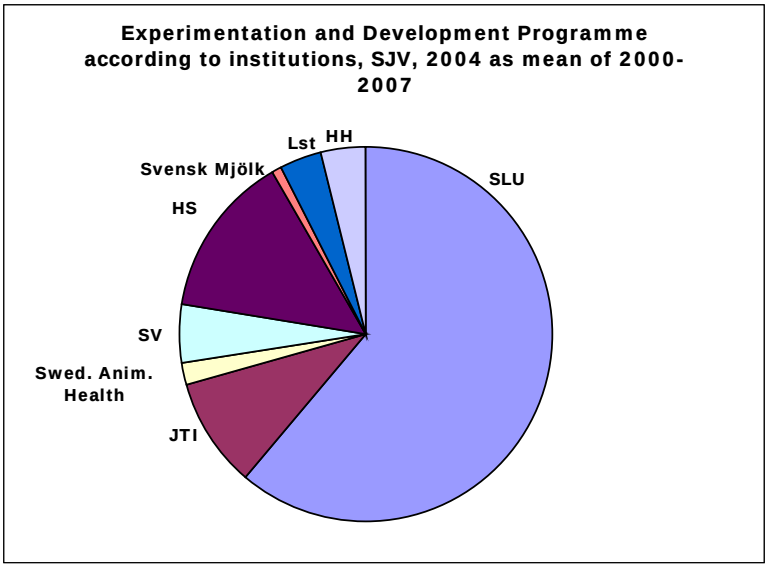

Figure 3. Research funding according to institutions in the SJV's national programme

For abbreviations see acronym list

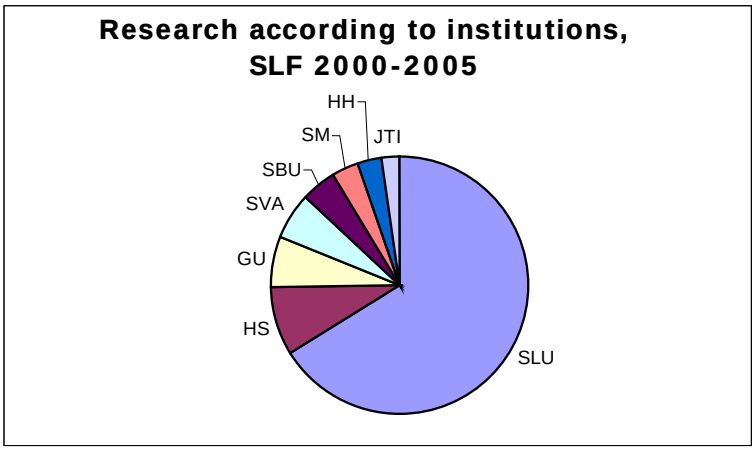

Figure 4. Research funding by the Swedish Farmers' Foundation for Agricultural Research SLF according to institutions (private funding)

For abbreviations see acronym list

Research facilities with all or parts of the farm converted to organic farming are mainly financed through research commissions.

5 Research facilities

5.1 Research farms

There are 16 experimental farms or agricultural colleges that host research, development projects, or long-term experiments related to organic farming in Sweden. The following research farms have been defined as organic as they host complete organic production systems i.e. cropping or animal production systems. These presented below – from the southern to the northern parts of Sweden.

Hillshög is located at Österlen in Scania in the lowlands. The farm has crop production (barley, white clover seed breeding, oats, wheat, peas, lupines, sugar beats) without any animals and consists of 28.5 hectares all organic farming. It was converted to organic farming between 1996 and1998, and the Rural Economy and Agricultural Societies (HS) in Kristianstad runs it. The farm has a fruitful cooperation with the conventional farm, Sandby farm, which is located near by.

Bollerup, Önnestad and Östra Ljungby are three agricultural colleges located in Scania. The schools have systems with and without ruminants. The organic part of the farming systems consists of approximately 1.7 hectares. The long-term experiment "Environmentally Sustainable Crop Rotations" has been running at the schools since 1986. The goal is to find connections between plant breeding, nutrient supply and food quality. Rural Economy and Agricultural Societies (HS) in Kristianstad coordinates the long-term experiment.

Alnarps experimental farm is located in the lowlands south of Lomma in the southwestern part of Scania. The farm has crop production (ley, sugar beats, vegetables, cereals) without animals. 20 hectares of the 350 hectares are organic since 1992. A long-term experiment on biogas production in crop rotation in Scania is running on the farm. The Department of Crop Production Ecology at the Swedish University of Agricultural Sciences runs the farm.

Lilla Böslid is located near Halmstad in Halland, it has crop production (on the clay soil: winter and spring grain, field bean, alfalfa, red clover and on the sandy soil: cereals, green manure, red beets, winter rape) and consists of 98 hectares of which 76 hectares is organic. The arable land was converted between 1989 and1994. HS in Kristianstad runs the farm.

Stenstugu is located on the Swedish island Gotland about 14 km from Visby. It has crop production (cereals, sugar beats, winter rape and peas). The farm consists of 175 hectares of which 10 hectares are approved by the Swedish certifier KRAV. The 10 hectares were converted in 1997. HS Gotland runs the farm experiments. The Swedish University of Agricultural Sciences owns the farm. A long-term conversion experiment has been going on since 1986.

Rådde farm is situated in Västergötland about 25 km from Borås. The farm has meat production with about 50 suckler cows + replacement and crop production with ley and fodder grains. The first parts of the 55 hectares of arable organic land were converted in 1989, whereas some parts have been converted as late as 2001. The whole farm is of 78 hectares arable land. A major part of the experiments in forage production in Sweden are carried out at Rådde experimental farm. Experiments combining cropping and feeding cattle have also been conducted. HS in Sjuhärad runs the farm.

Klostergården is situated about 10 km north of Linköping in Östergötland. The farm has crop production (winter and spring wheat, rye and peas). The farm consists of 97 hectares of which 45 hectares are organic. The farm has no regular long-term experiments, but since the conversion between 1996 to1999, yearly recordings of the amount of weeds and pests, as well as soil analysis has been performed in specific checkpoints in the fields. HS in Östergötland runs the farm.

Logården is situated about 2 km from Grästorp in Västergötland. The farm has crop production (field bean, spring wheat, oats, green manure, winter rape, winter wheat, rye). The farm has hectares of which 22 hectares are under organic management. , 28 hectares are integrated and 10 hectares conventional production. The farm was converted in 1991, and since then a long-term experiment to develop environmentally sound and productive farming systems has been going on –

the experiment focuses on three different productive systems: organic, integrated and conventional farming. HS in Skaraborg runs the farm.

Lanna experimental farm is situated 20 km from Skara in Västergötland. The farm has crop production (winter wheat, barley, oats, rape seed). The main part of the farm is run conventionally, 10 hectares of the total of 155 hectares is organically produced. The organic parts were converted in 1996 and 2003. The farm is situated in lowland. Two long-term experiments are going on at Lanna. These are focusing on nutrient losses and nitrogen turn over on farms with and without animals on loamy soils in Västergötland. The Swedish University of Agricultural Sciences runs the farm.

Tingvall is situated 20 km east of Tanumshede in Bohuslän. The farm has milk production with facilities for 65 cows and fodder production. The farm consists of 130 hectares – everything is organically produced according to standards set by the Swedish certification organisation KRAV. The farm was converted in 1989–1992. Since 1990 changes in the weed flora, soil nutrition levels and the botanical composition of the ley harvests have been surveyed and mapped. Research on organic dairy production has been performed from the start on the farm. HS in western Sweden runs the farm.

The agricultural college Dingle is located 30 km north of Uddevalla in Bohuslän. The farm has milk production with about 70 cows and replacing heifers, piglet production with about 20 sows, 10 suckler cows and crop production (mainly fodder). The farm has 225 hectares arable land of which 150 hectares are organic and approved by KRAV. Since 1999 a crop rotation experiment has been going on at the farm. Parts of the farm have been converted since 1981 until 2002. Sweden's County Administration in western Götaland runs the farm.

Skilleby farm is located 12 km south of Södertälje in Sörmland. The farm has milk production (0.6 animal units per hectare) and crop production (ley, cereals and some vegetable production; 2 ha hectares). The farm has 40 hectares. The farm has been run bio-dynamically since the middle of the 1960s. Since 1991 a green manure experiment has been going on at the farm. The neighbouring farm Yttereneby runs the experimental farm.

Kvinnersta is located 10 km north of Örebro in Närke. The school has conventional milk production with about 80 cows and replacing heifers as well as crop production (fodder, cereals and leguminous plants). The school consists of 280 hectares of which 140 hectares are organic. The farm was mainly converted in 1989 and between 1996 and 2002. A long-term experiment comparing organic and conventional farming systems (mainly ley and wheat production) has been going on since 1992. In 2004 a long-term experiment dealing with sustainable leguminous plants in leys was started. Örebro district and the agricultural college Kvinnersta run the farm.

Riis Lillerud is located 15 km west of Karlstad in Värmland. The school has crop production (cereals and ley) and also conventional milk production with about 60 cows and pig production with about 100 sows. The school has 250 hectares of which 70 hectares are organic. The unit called Riis consists of 25 hectares and is the part of the school that has research and development projects. The unit was mainly converted in 1986, even though some parts were converted earlier. The school is situated in lowland. Since 1998 a crop rotation experiment has been going on at Riis. Lilleruds gymnasium runs the farm.

Ekhaga experimental farm is situated about 7 km east of Uppsala in Uppland. The experimental farm has two different farming systems operating – one with animals and one without (oats, ley, winter wheat, peas and potatoes). The total area of farmland is 24 ha. The farm was converted in 1988. The type of animals and production depend on the experiments that are going on. The Swedish University of Agricultural Sciences runs the farm.

Öjebyn is situated 5 km north of Piteå in Norrbotten. The farm has fodder production (cereals and ley). The acreage is 160 hectares of which 140 hectares are organic. Crop rotation experiments have been going on for more than 30 years. Variety testing programmes of cereals and herbage plants are done. In 1990 55 hectares were converted and in 2003 another 85 hectares. The estate office and

the north experimental district at the Swedish University of Agricultural Sciences (SLU) run the farm.

5.2 Experimental fields

For information of the crops and farm animals see under description of each farm in the text above

- *Hillshög*, 28.5 hectares organic, converted in 1996-1998
- *Bollerup, Önnestad and Östra Ljungby,* 1.7 hectares organic, conversion year 1986
- *Alnarps experimental farm,* 20 hectares organic, main conversion in 1992
- *Lilla Böslid,* 76 hectares organic, conversion years 1989-1994
- *Stenstugu,* 10 *hectares* organic, converted in 1997
- *Rådde farm,* 55 *hectares* organic, converted in stages in 1989 to 2001
- *Klostergården*, 45 hectares organic, converted in 1996-1999
- *Logården,* 22 hectares organic, converted in 1991
- *Lanna experimental farm,* 10 *hectares* organic, converted in 1996 and 2003
- *Tingvall,* 130 *hectares* organic, conversion years 1989-1992
- *The agricultural college Dingle,* 150 *hectares* organic, conversion 1981 to 2002
- *Skilleby farm,* 40 hectares organic, converted biodynamic in the mid 1960s
- *Kvinnersta,* 140 hectares organic, converted in 1989 and 1996 to 2002
- *Riis Lillerud,* 70 hectares organic, main conversion in 1986
- *Ekhaga experimental farm,* 24 hectares organic, converted in 1998.
- *Öjebyn,* 140 *hectares* organic, conversion years 1990 (55 hectares) and 2003(85 hectares)

5.3 Animal research facilities

Facilities with integrated animal and crop production

Tingvall Organic Dairy Farm. A loose-housing system with two experimental groups of dairy cows. Useful for whole-lactation dairy cow experiments. A total of 70 dairy cows and integrated organic fodder production, all organically certified. Research on organic dairy production has been performed from the start on the farm.

Rådde Organic Beef Research Farm. The farm has organic meat production with about 50 suckler cows and replacing heifers as well as integrated crop production with ley and fodder grains, all organically certified. The experimental farm also has 50 hectares of semi-natural grasslands, one third of this being extraordinary flora. There are great possibilities for grouping animals in grazing experiments. A loose-housing system with 8 pens and 8 animals per pen in an uninsulated barn with a deep litter system makes group feeding possible. There are possibilities for individual animal weighing and dry matter measurement of fodder.

Facilities for animal research

Odarslöv Organic Pig Research Farm, SLU Alnarp (Department of Agricultural Biosystems and Technology). An insulated pig house for experiments with growing-finishing pigs in association with grazing paddocks contains eight pens with 16 pigs per pen; four pens with deep litter system and four pens with straw flow system.

Lövsta Pig Research Station, SLU Uppsala (Department of Animal Nutrition and Management). Twelve insulated huts for outdoor farrowing. Four pig houses for groups of four grazing sows and piglets per house. Six sun shelters, experimental material for outdoor feeders and paddocks. Cameras and tape recorders are available for behaviourial studies. In addition, one uninsulated building for experiments, especially during the winter.

Kungsängen Research Centre, SLU Uppsala (Department of Animal Nutrition and Management). The research facility consists of an insulated barn with 46 individual stalls for dairy cows and 54 dairy cows in a loose-housing system with an automatic milking system (AMS). The amount of milk and milk composition could be recorded at each milking. Approx. 8–10 cows are fistulated. There are 60 cubicles for grouped growing cattle in a loose-housing system and 4 pens with 14 calves per pen and artificial milk feeders. In addition, there are 20 individual stalls for growing cattle. All cubicles and pens are available for behaviour studies. The cows are individually fed with both forage and concentrate. The calves are individually fed and the growing cattle are group fed. A total of eight different concentrates and four different forages could be fed at the same time without extra work. The quality of milk and meat produced, and the feed used are possible to investigate further on in nearby located laboratories.

Röbäcksdalen Dairy and Sheep Research Centre, SLU Umeå (Department of Agricultural Research for Northern Sweden). The dairy research facility consists of a dairy barn with 120 cows and 100 replacement heifers in a loose-housing system with cubicles. Half the barn is insulated and half is uninsulated. Sixty of the cows could be individually fed by automatic weighing troughs. The other 60 cows and all replacement heifers could be group fed. The amount of forage consumed will be automatically registered and at the same time the eating pattern of the cows will be registered. All cows will be weighed at each milking. The amount of milk and milk composition could be recorded at each milking. There are 22 bunker silos of different size available. Rumen fistulated animals are available if needed. Good possibilities also exist to conduct studies in animal welfare and behaviour. The quality of milk and meat produced, and the feed used are possible to investigate further on in nearby located laboratories.

At Röbäcksdalen, there also exists a sheep flock of 60 ewes. They are kept in an uninsulated building on bedded straw. They are normally group fed, but the size of the group could vary a lot.

Götala Beef Research Station, SLU Skara (Department of Animal Environment and Health). Insulated barn, 16 pens with slatted floors and up to five animals per pen, a total of 80 animals. Uninsulated barn, 12 pens with scraped floor and straw bedding, six animals per pen, a total of 72 animals. Insulated barn with eight individual stalls with rubber mat flooring for intensive studies. IGER chewing equipment for cattle.

Funbo-Lövsta Poultry Research Centre, SLU Uppsala (Department of Animal Nutrition and Management). One poultry house with 12 replicates with individual fodder/egg/production data in big cages, outdoor keeping is available in the same individual groups (approximately 100 animals per group). Pneumatic automatic computerised feeding system. Organic chicken production in two poultry houses with automatic feeding system and outdoor keeping. The group size can be varied, a total of 5 000 animals. An own small slaughter house is used for the chickens. Indoor floor feeding in small groups of different organic feed can be studied, a total of 60 groups.

Alnarp Experimental Cattle Farm Mellangård, SLU Alnarp (Department of Agricultural Biosystems and Technology). The aim is to investigate the influence of different floor systems, lying surfaces fittings and fixtures on the health, behaviour, milk quality and milk yield of the diary cow. Especially, the hoof health is of interest. The whole attached building complex has a cubicle barn, a milking parlour compartment, tie stalls, calving compartment and feed storage. The cubicle barn has in total 180 cubicles. At present, the reconstructed part accommodates 80 heads and is divided in four compartments. These have the same layout with the exception of with and without feedstalls and different floor system. The compartments are constructed with a “double floor” in order to have the option to change the layout and the top floor easily. The rest of the cubicle barn can be use as a control group.

5.4 Leaching fields

Leaching fields where drainage and surface runoff is collected and measured can be found at *Lanna* and *Logården*. Systems of tiled drains have been installed allowing for separate samplings from each experimental plot/field.

5.5 Long-term experiments

- *Bollerup, Önnestad and Östra Ljungby*. The long-term experiment "Experiments with environmentally sustainable crop rotations" of 2.9 hectares has been running at the schools since 1986. The goal is to find connections between plant breeding, nutrient supply and food quality.
- *Alnarps experimental farm*. A long-term experiment on biogas production and the use of the digested residue in the crop rotation is running on the farm.
- *Stenstugu*. A long-term conversion experiment has been going on since 1986.
- *Klostergården*. The farm has no regular long-term experiments, but since the conversion in between 1996 and1999, yearly recordings of the amount of weeds and pest, as well as soil analysis has been performed at specific checkpoints in the fields.
- *Logården*. Since 1991 a long-term experiment to develop environmentally and productive farming systems has been going on – the experiment focuses on three different productive systems: organic, integrated and conventional farming.
- *Lanna experimental farm*. Two long-term experiments are going on at Lanna. These are focusing on nutrient losses and nitrogen turn over on farms with and without animals on loamy soils in Västergötland.
- *The agricultural college Dingle*. Since 1999 a crop rotation experiment has been going on at the farm.
- *Skilleby farm*. Since 1991 a green manure experiment has been going on at the farm.
- *Kvinnersta*. A long-term experiment comparing organic and conventional farming systems (mainly ley and wheat production) has been going on since 1992. In 2004 a long-term experiment dealing with sustainable leguminous plants in ley was started.
- *Riis Lillerud*. Since 1998 a crop rotation experiment has been going on at Riis.
- *Öjebyn*. Crop rotation experiments have been going on for more than 30 years.

5.6 Networks

Several private farms, besides the research farms presented above, are also communicating with each other and/or conduct research at their own farms. There are around 15 active participatory research groups in Sweden today. These groups normally consist of a number of farmers, an advisor and a researcher. One person also functions as a facilitator. The farmers learn to improve their own problem solving but also to do research together with scientists. Network building as well as documentation and communication of the working process and the research results are also part of the learning process. Some groups started their work as early as 1998 whereas some groups just have been formed. Each group consists of between 7 to 16 farms and works with a specific topic for example: biodiversity on a farm scale, organic dairy production, organic crop production, organic ley crop seed production organic greenhouse tomato production, vegetables production outdoors, weeds, potatoes and cropping systems.

5.7 On farm studies

Some organic farmers make their farms available for research in relation to different projects. Such projects are for example performed in collaboration with advisors at the Rural Economy and Agricultural Societies, the Swedish Ecological Farmers Association, the Federation of Swedish Farmers,

Sweden's County Administration and with researchers at the Swedish University of Agricultural Sciences. The activities are commonly funded by national research programmes or by a specific training programme in organic farming (KULM) administrated by the Swedish Board of Agriculture (SJV).

6 Initiation of research and stakeholder engagement

The Centre of Sustainable Agriculture (CUL) coordinates the formulation of a National Research Framework programme on a triennial basis, involving different stakeholders in the identification and prioritisation process. The first Framework Programme was published in 2001 and the second in 2003. In 2003 a revision of the first Framework Programme was conducted, and a number of stakeholder representatives were sent the current Research Framework Programme as a basis for internal discussions on renewal and proposals. After this, two rounds of proposals were sent out for revision to different stakeholder representatives, and the points of view were integrated, valued against each other and incorporated. Before the last round of revision a workshop was held to discuss the frame programme proposal with a "national advisory group" coordinated by CUL for the follow up of financing of organic farming research and development in Sweden. The group and the coordination by CUL are appointed in the Swedish National Action Plan for the fulfilment of the political goals of organic farming. The national advisory group consists of public and private financing agencies in the organic food and farming system, authorities of food, consumer, environment and agricultural issues (including national advisory service in organic farming), primary producer organisations and representatives of the organic food chain. Researchers are not represented in the national advisory group.

Principles of organic farming and different perspectives (i.e. farmer, consumer, civil) on an organic food and farming system are presented in the Research Framework Programme. Participatory approaches such as the use of focus groups and participatory learning and action research are described and suggested for different areas in the programme.

National research needs in Swedish organic production and consumption are currently:

- Optimisation of animal production systems
- Ecology and crop protection in organic cropping systems
- Plant nutrient turnover and nutrient recycling
- Multifunctional agricultural systems
- Food – quality – health
- Large-scale conversion to organic production – driving forces, obstacles and consequences for the market
- Resource dependency of the food systems
- Experimental farms and smaller innovative projects

A third research frame programme is planned for autumn 2006 with stakeholder involvement in a workshop, discussing a proposed national programme and a second round of comments on a proposed document on a written basis, during autumn 2005 and spring 2006. It is suggested that the coordinated frame programme could be used directly by Formas, as well as other funding agencies for call descriptions.

7 Use of the Research Programme

The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) has in different ways used the Research Frame Programme. In the research programme call for the period 2001 to 2003 Formas formulated a programme description based on the frame programme coordinated by CUL. For the period 2004 to 2006, Formas presented headlines similar to the ones in the frame programme coordinated by CUL. Hence there was no full programme description in the Formas call:

- Integration of animal and crop production systems
- Weed and pest management without chemical pesticides
- Plant nutrient turnover and losses
- Biological manifold and landscape ecosystem services
- Vulnerability of cropping systems, resource dependence
- Multifunctional agricultural systems
- Driving forces, barriers and tools in the conversion process
- Institutional frameworks, organisation and market
- Food quality and health effects

The Swedish Board of Agriculture (SJV) has a programme description on applied research and development in organic production, based on both the Research Framework Programme and the identifications of bottlenecks by researchers. Identified research needs in 2005 in organic farming are:

- Animal welfare
- Animal production (pigs and ruminant feed)
- Horticultural production
- Crop production (specific crops production, weed management)

The Swedish University of Agricultural Sciences (SLU) administrating the "Ekoforsk" programme uses specific parts of the coordinated research frame programme, with focus on applied research solving bottlenecks in primary production.

The National Food Administration (SLV) and the National Veterinary Institute (SVA) have taken active part in the formulation of the coordinated research frame programme and use the programme in the implementation of research.

8 Selection criteria and evaluation procedures

The three different funding agencies of publicly funded research in organic farming and food systems have different selection and evaluation procedures as well as different criteria.

8.1 Formas

The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), funds research in organic farming and food systems that are hosted by a Swedish University or other Swedish researching institute of authority. Project applications are rated and ranked by an external expert panel of eight to ten persons, including researchers (minimum qualification is associate professor) as well as one to two experts of relevance. Between 30 to 50 percent of the experts are recruited from outside Sweden. All experts read and evaluate all applications. The expert panel is working under guidelines formulated by the Formas board and administrative staff. Each expert

is responsible for presenting and formulating a written judgement on up to ten applications at the panel meeting.

Criteria for the rating of applications are:

1) Problem statement (objective, theory, hypothesis, news value) (grading 1–10)
2) Material, method and work plan (grading 1–10)
3) Competence of applicant (publication frequency) (grading 1–6)
4) Relevance (sector and societal) (grading 1–6)

Criteria 1–3 are weighed together to a scientific value of the application. Depending on the rating according all criteria applications are ranked in three groups; A (high priority, acceptance recommended), B (acceptance recommended but less priority) and C (not recommended). Changes on costs are suggested for the final decision. The Formas board takes the final decision on research financing of projects up to three years. All applicants receive a written judgement on their application. Progress of the research project is not followed during the financing period and reporting (costs and results) is only carried out once, finalising the project.

8.2 SJV - The Swedish Board of Agriculture

The Swedish Board of Agriculture (SJV) funds applied research and development in organic production. Applicants can be research institutions as well as private advisory services as well as other organisations and individuals. The selection procedure is first carried out by an internal group of selected persons from the Regional Animal Husbandry and Crop Production Advisory Service plus other personnel at SJV. Following a list of criteria the group commonly rates and ranks the applications. In a second stage the applications and rankings are discussed in an external advisory reference group consisting of representatives from:

- The Swedish Ecological Farmers Association
- Association of Swedish Growers (GRO)
- Federation of Swedish Farmers (LRF)
- The Swedish Federation of Rural Economy and Agricultural Societies (HS)
- Swedish Animal Health Service
- Swedish County Administrations
- Swedish University of Agricultural Sciences (SLU)

In a third stage there is a possible communication between SJV and certain applicants to discuss costs and activities in projects of potential funding. The final decision is made by SJV. Annual progress reports are required and evaluated before funding.

8.3 SLU – Ekoforsk

The Swedish University of Agricultural Sciences (SLU) uses a two-step selection procedure for the Ekoforsk Programme, under which projects of one to three years are funded. The main applicant must be a SLU researcher, but funding researchers outside SLU is possible and promoted. In a first step a short summary (two pages) of the project idea is presented with a brief description of the idea, a problem statement, the method, literature review and a rough budget. The project ideas are firstly ranked by relevance by advisors at regional level responsible for development of organic primary production. Secondly, an expert panel (scientists, advisors and organic farmer association representative) appointed by SLU rate and rank the project ideas based on the evaluation of methodology and on scientific quality.

In a second step of the selection procedure, based on this ranking a number of project ideas (twice the number for which funding is actually available) are invited to submit a full application. These

applications are rated by a panel of national and international scientists (two specialists per application) based on a questionnaire with criteria. The expert panel rates and ranks the projects and suggests project budget adjustments of the applications. This judgement is based the experts' own ranking and specialist rating. Rating is based on relevance, methodology and scientific quality. Ranking is performed with reference to rating but also to an even distribution on prioritised areas. Participatory research methodologies are promoted. The final decision of funding is taken by the rector at SLU. Annual progress reports are required.

9 Utilisation of research

In a participatory perspective there is a range of approaches for the utilisation of research by end users. In participatory learning and action research farmers, advisers and researchers work together and the use and evaluation of research results are part of the research process. The Centre for Sustainable Agriculture (CUL) at SLU is responsible for communication and for informing the stakeholders of the organic sector. Seminars and workshops are organised at regional and national level. The funding agencies Formas, SJV and Ekoforsk at SLU have their own communication and information activities, some of which are carried out in cooperation with CUL. The Ecological Forum, administrated by the Royal Academy of Agriculture and Forestry, organises workshops and seminars on hot topics in the organic food chain. Most activities of the responsible agencies are planned and conducted in collaboration with broad reference groups.

The concept of distance learning is used for further education of farmers and advisors. These courses consist of three to four national central meetings in combination with the study of current literature and individual project work. The meetings arranged at SLU give opportunities for close dialogues between researchers, advisors, lecturers and farmers. Lectures are combined with discussion sessions. Farmers with a long experience of organic farming interact with farmers who are less experienced or beginners. The concept of this course, given since 1995, has attracted big interest over the years.

Table 12. Activities for utilisation of research in organic food and farming, participants and responsibility

Activity	Participating	Responsible parts
Participatory Learning and Action research	Farmers, advisors, researchers	Facilitation support by CUL, financial support by the Swedish Board of Agriculture (SJV)
Workshops in Ekoforsk programme	Researchers, advisors and farmers	Ekoforsk administration and CUL
Further education by distance learning courses with central lecture and discussion meetings	Farmers, lecturers, advisors and researchers	CUL, SJV
Open seminars and workshops on hot topics	Researchers, stakeholders in the organic food chain, politicians	Ecological Forum (Royal Academy of Agriculture and Forestry), CUL
National biannual organic congress	Researchers, stakeholders in the organic food chain, politicians, farmers	CUL, financial support by SJV
Part -time national consultants in crop production systems, vegetable production and animal production systems	Three university researchers in communication with researchers and regional advisors	CUL

KULM-programme	Courses, consulting and information material focused on farmer competence development	SJV
Seminars and workshops on development of organic markets	Stakeholder involvement for development of organic markets	Centre for organic markets (EMC)
Homepages	Publication of research reports and communication activities. Internet addresses: www.cul.slu.se, www.evp.slu.se/ekoforsk/, www.sjv.se, www.formas.se	CUL, Ekoforsk, SJV, Formas
Project databases: CUL database Växteko Organic Eprints	Internet access to organic farming research projects and publications Internet addresses: www.cul.slu.se/english/research/index.html/sll.bibul.slu.se/, www.orgprints.org/	CUL, SJV/SLU, Formas/ CORE Organic
Nordic publication on resent organic farming research, Forskningsnytt, 4 issues/yr	Researchers in the Nordic countries	CUL (responsible editor), national collaborating editors in DK, NO, FI and IS
Synthesis, state of the arts, reports on hot topics	Researchers and sometimes different stakeholders	CUL

10 Scientific education & research schools

10.1 Pedagogical approach

CUL finances the Swedish participation in the Nordic network AGROASIS (Nordic School of Agroecology/Ecological Agriculture, which is currently developing a common MSc in agroecology. The objectives are among other things to promote the development of ecological and sustainable food systems and to emphasize the multifunctional role of agriculture. The educational programme is based on agroecology with a clear interdisciplinary approach including e.g. producers, consumers or citizens. The curriculum has been organised around the principles of experimental or action education. Learning is seen as experience, reflection, action and reflection both within courses as well as in the order of courses.

Distance learning is one way of creating a forum for dialogue with different perspectives and different kinds of knowledge, i.e. scientific and experimental. This is a fruitful pedagogical approach: literature studies and project work are carried out at a home university or home region combined with intensive common activities such as lectures, seminars and workshops, at which literature and research issues are discussed. At the Swedish University of Agricultural Sciences (SLU) the approach has been used in national PhD courses as well as in further education with farmers, lecturers, advisors and researchers (see also chapter on Utilisation of research).

10.2 MSc level

Courses are given at the Swedish University of Agricultural Sciences (SLU). Many disciplinary courses at MSc-level are very general about biological and ecological principles that have possible application in many different production systems. Some of these courses are of more direct interest for organic agriculture, e.g. courses in biological pest control (offered by the Faculty of Landscape Planning Horticulture and Agricultural Science, at the campus in Alnarp). SLU does not offer any

specified production courses in organic farming at MSc-level. SLU offers courses, though, which have been designed to fit a general Nordic MSc programme structure in Agroecology (with different profiles in the different Nordic agricultural universities). These courses (e.g. "Adaptive Management[4] – Theory Course", "Adaptive Management – Project Course", and "Qualitative Methods". These and the planned new courses in "Environment Valuation" and "Emergy Synthesis") are meant for an interdisciplinary theoretical and methodological basis in Agroecology which seen as an interdisciplinary subject for designing and evaluating sustainable agriculture systems.

10.3 PhD level

The Centre for Sustainable Agriculture (CUL) at SLU hosts the Research School SwOFF (Swedish Research School in Organic Farming and Food Systems), which organizes *ad hoc* courses in different areas of organic farming. Some of these courses are designed in cooperation with other Nordic universities and especially with the Danish research school SOAR.

Examples of course titles that have been offered are: "Agroecology, with emphasis on horticultural cropping systems", "Biodiversity in cultivation systems", "Introduction to emergy synthesis – tools to analyse society and environment", "Local and regional dynamics", "Multifunctional animal husbandry", "What does a systems approach in research mean?"

10.4 Methodological education

Researchers have some access to distance courses arranged for advisors. These courses cover participatory learning and action research. They are arranged by CUL and financed by the Swedish Board of Agriculture (SJV).

The Unit of Applied Field Research at SLU gives courses in experimental design and statistical planning according to research area and issue. Currently these courses are not specific for organic farming research or research with a systems or systemic approach. In the future, however the Unit will be responsible for applied field research issues also in the area of organic farming.

11 Acronyms

FOR – Swedish Organisation of Leisure Gardening Societies

Formas – The Swedish Research Council for Environment, Agricultural Sciences and Spatial planning

GRO – Association of Swedish Growers

GU – Göteborg University

HH – University of Halmstad

HS – The Swedish Federation of Rural Economy and Agricultural Societies

JTI – Swedish Institute of Agricultural and Environmental Engineering

KULM – Competence programme of farmers concerning environmental issues

LRF – Federation of Swedish Farmers

LsT – Swedens County Administration

NV – Swedish Environmental Protection Agency

[4] This course will change name to "Sustainable Natural Resource Management"

SBU – Swedish Beet Research

SJV – Swedish Board of Agriculture

SLU – Swedish University of Agricultural Sciences

SLV – National Food Administration

SM – Swedish Dairy Association

SU – Stockholm University

SVA – The National Veterinary Institute

SwOFF - Swedish Research School in Organic Farming and Food Systems

UU – Uppsala University

12 Literature

Geber, U.; Ivarsson, K. and Källander, I. (2005) The Swedish challenge – interdisciplinarity, collaboration and integration for research and development in organic farming. Paper presented at Researching Sustainable Systems - International Scientific Conference on Organic Agriculture, Adelaide, Australia, September 21-23, 2005. http://orgprints.org/4227/

Annex

Annex 1. Yearly financing average for projects within Formas I over the period 2001–2003

II	**Animal husbandry**	**Amount 1000 EUR**	**Amount 1000 SEK**
1	Organic pig production – Investment in uncertain conditions in an oligopolitic market	32.5	295
2	Ecopig – an interdisciplinary research programme within ecological pig production	440.0	4 000
3	Milk production from legume-rich silage, root crops and potatoes	16.0	145
4	Lungworm in cattle in organic production	38.2	347
5	System for free range slaughter pigs in organic agriculture – animal environment, management of plant nutrients and working environment	110.0	1 000
6	The significance of animal material in egg production under organic conditions	60.1	546
7	Rotation of grazing between cattle and poultry	47.6	433
III	**Crop husbandry**		
8	Interaction between pests and their natural enemies in organic apples	71.5	650
9	Green manure crops as a multifunctional tool in vegetable growing	440.0	4 000
10	Automation of mechanical weed control	38.2	347
11	Production of digestion residue of high ammonium content	56.8	516
12	Introduction of nitrogen effectiveness, competition by weeds and allelopathy in the breeding material of barley and wheat	60.5	550
13	Germination and early growth of annual weeds	93.0	845
14	Development of locally adapted cereal varieties for organic farming through participatory research	30.4	276
15	Monitoring and long-term control of the carrot psyllid – Organic production and safe infant food	93.0	845
IV	**Soil**		
16	Microbial interactions in the mycorrhizosphere and their significance for sustainable - low input – agriculture	133.0	1 209
17	The effect of cuttings on nitrogen fixation, rhizodeposition, plant material quality and decomposition of legumes	42.9	390
18	The effect of organic residues on the genetic and metabolic diversity of soil micro organisms in the nitrogen cycle	61.1	555
19	Surface characterisation of phosphorus contents on soil particles by photoelectron spectroscopy (ESCA) of soils in different agricultural systems	21.9	199
20	Carbon balances in organic agriculture	57.2	520
21	Quantification of the contribution of mineral weathering to the supply of potassium to plants on different types of agricultural land	71.5	650
V	Environmental aspects		
22	Landscape ecology of organic production – plant protection and biodiversity	220.0	2 000
VIII	**Knowledge management**		
23	Swedish Research School in Organic Farming and Food Systems	55.0	500

(1 SEK = 0.11 EUR)

Annex 2. Yearly financing average for projects within Formas II over the period 2004–2007

		Amount 1000 EUR	Amount 1000 SEK
I	**Farming systems**		
1	Green tractor – bio-based fuels for use in organic farming in long term perspective	69.3	630
II	**Animal husbandry**		
2	Optimization of organic broiler production	178.2	1 620
3	Animal health in organic dairy farms	89.1	810
4	Development of protection against lungworm – analysis of the parasites genetic diversity and antigen variation	74.3	675
5	What is natural behaviour in a domestic animal? Philosophical analysis of a central concept in organic agriculture	49.5	450
6	Dairy cows adapted for organic production	52.0	473
7	Optimization of nutritional balances in Swedish organic egg and poultry meat production	118.8	1 080
8	Non chemical control of nematode parasites in sheep by the controlled release of the nematode destroying fungus *Duddingtonia flagrans*	38.0	345
III	**Crop husbandry**		
9	Genetic diversification as a tool for reducing pest damage in organic vegetable production	133.7	1 215
10	Organic milk – Growth, N dynamics and changes in nutritional quality in mixed leys with red clover, birdsfoot trefoil and grass for organic milk production	81.7	743
11	Protein enrichment of feed grain with microfungi	74.3	675
12	The effects of the preceding crop on plant disease dynamics, control of nutrients and quality, in malting barley	96.6	878
13	Selection of genotypes with high N-use efficiency, weed competition and allelopathy in breeding materials of wheat and barley for organic farming	81.7	743
14	Cultivation and feeding value of narrow-leafed lupine – a comparison with peas	89.1	810
15	Isolation and identification of weed suppressing factors secreted by barley	64.4	585
16	Weed control in organic farming – a study of sow-thistle (Sonchus arvensis L)	89.1	810
17	Allelobiosis and aphid control in organic farming	56.9	517
18	Relay cropping for increased sustainability in organic farming	118.8	1 080
IV	**Soil**		
19	The sulphur availability to arable crops – the role of farmyard manure, soil organic matter and mineral fertilizers in conventional and organic farming systems	104.0	945
20	K-dynamics in agricultural soils – quantifying sources and sinks and identifying soils (areas) in need of K-supplementation	111.4	1 013
21	Nitrogen fixation in green manure leys – quantification of total below- and above-ground N	104.0	945
22	Different legume-rhizobia symbioses and their N_2 fixation in field	38.6	351
	Nitrous oxide emissions from organic farming driven by nitrogen use efficiency		
V	**Environmental aspects**		
23	Landscape ecology of organic production – plant protection and biodiversity	103.2	938
24	Food webs, landscapes and natural enemy efficacy in organic production systems	52.0	473
25	Nitrous oxide emissions from organic farming driven by nitrogen use efficiency	126.3	1148
VIII	**Knowledge management**		
26	Learning in Local distribution systems – a driving force for sustainable development in agriculture?	81.7	743
27	Swedish research school in organic farming and food systems	59.4	540

(1 SEK = 0.11 EUR)

Annex 3. Budget for projects in Ekoforsk I presented in yearly average over the period 2002–2004

		Amount 1000 EUR	Amount 1000 SEK
I	**Farming Systems**		
1	Nutrition strategies in organic plant husbandry	59.0	536
2	The ecology of the cultivation system - Green manure as a multifunctional "tool" in vegetable production	35.8	325
II	**Animal husbandry**		
3	Ecopig - a multidisciplinary research programme within organic pig production	44.0	400
4	Dry matter intake of birdsfoot trefoil and white clover in growing heifers	2.4	22
III	**Crop husbandry**		
5	Field bean (*Vicia faba* L.) intercropped with spring wheat as whole crop silage - yield and fodder quality	27.4	249
6	High-protein fodder for grazing or whole crop silage	48.6	442
7	Intercropping of narrow-leafed lupine and field bean with cereals for grazing or whole crop silage	40.9	372
8	Regulation of legumes by mixing different varieties of ryegrass with white clover for silage and grazing	17.3	157
9	Management of quackgrass (*Elymus repens*) by utilizing plant competition and cutting	39.2	356
10	Physical weed control in row-grown vegetable crops	48.4	440
11	Soil cover with plastic in connection to sowing of row-cultivated crops	15.3	139
12	The dynamics of potassium in organic crop production – with emphasis on leys	23.5	214
13	Tuber growth and tuber yield in three different potato cultivars	50.5	459
14	Organic production of quality wheat	63.7	579
15	Organic production of winter oilseed rape	24.9	226
16	Organic seed crops of timothy, meadow fescue and red clover	41.6	378
17	The breaking of soil crust by spring harrowing in autumn-sown cereals	21.6	196
IV	**Soil**		
18	Evaluation of soil mixtures for organic production of horticultural seedlings	43.6	396
VIII	**Knowledge management**		
19	Documentation of research stations/parks or farms with land under organic cultivation	133.4	1 213
20	Implementation and coordination	54.0	491
21	Documentation and participatory learning on organic farms	22.0	200

(1 SEK = 0.11 EUR)

Annex 4. Budget for projects in Ekoforsk II presented in yearly average over the period 2005–2007

		Amount 1000 EUR	Amount 1000 SEK
I	**Farming systems**		
1	Cultivation systems on organic arable farms – improvement of plant nutrient management	45.2	411
II	**Animal husbandry**		
2	Silage of faba beans/spring wheat to dairy cows	17.4	158
3	Optimization of diets in organic poultry production	55.0	500
4	Locally produced protein feeds and vitamin supply for dairy cows	79.8	725
5	Tanniferous forage for improved nitrogen efficiency in organic dairy production	99.0	900
III	**Crop husbandry**		
6	Protein quality and fatty acids in seeds of hemp	8.9	81
7	Nitrogen supply to organic winter oilseed rape - nitrogen sources, time of application and incorporation	63.0	572
8	Development of organic ley seed production using participatory methods	36.0	327
9	Influence of application technology on the effect of oil and/or soap when used against pests in production of fruit and berry	63.5	577
10	Establishment and weed management in organic seed-growing of white clover, red clover and grass	55.9	508
11	The use of compost to control corky-root (*Pyrenochaeta lycopersici*) of tomato in organic production	55.0	500
12	Weed control in organic farming – a study of Perennial Sow-thistle	34.1	310
13	Investigation of new pre-sprouting techniques to achieve faster emergence and tuber development in organic potato farming	57.4	522
14	Winter oilseed rape established in living mulch of white clover	58.7	534
IV	**Soil**		
15	Residual effects of various systems for the use of green manure crops	2.0	18
16	Symbiotic nitrogen fixation in clover-rich leys - quantification of nitrogen in the entire plant and in rhizodeposits	53.5	486
17	Course of nitrogen mineralization after fertilization with organic fertilizers at different times of the year	23.8	216

(1 SEK = 0.11 EUR)

Annex 5. Yearly financing average for projects within SLF over the period 2000–2005

		Amount 1000 EUR	Amount 1000 SEK
I	**Farming systems**		
1	The Öjebyn project – organic production of food	22.0	200
2	Developing sustainable and productive cropping systems - characterisation of clay soil	44.0	400
3	Outdoor pig systems in organic agriculture – animal environment. plant nutrient management and working environment	33.0	300
4	Development of integrated organic and conventional crop production	49.5	450
5	The contribution of multifunctional farms to rural development and possibilities for collaboration with local communities	38.5	350
II	**Animal husbandry**		
6	Stimulation of the immune defence of the cow with ginseng for prevention and treatment of mastitis	35.8	325
7	Integrated pest management of the poultry red mite	41.8	380
8	Control of worm parasites in sheep by the use of nematode-destroying fungi	11.0	100
9	Different systems for calf rearing	11.0	100
10	Organic pig production – a possibility for growth for smaller producers? An economic comparison of production according to KRAV or EU-rules	22.0	200
III	**Crop husbandry**		
11	Mould and yeast inhibitory lactic acid bacteria for biopreservation of silage and other animal feeds	49.5	450
12	*Paenibacillus polymyxa* as plant-growth promoting and stress-tolerance inducing bacteria	43.5	395
13	Biological control – genetic analysis of mechanisms	55.0	500
14	Weed biocontrol by microorganisms	33.0	300
15	Plant disease control using mycorrhiza	44.0	400
16	Biological control of plant diseases by systematic induced resistance	23.7	215
17	Biological possibilities for the control of mycotoxin producing	35.8	325
18	Biological control – genetic analysis of mechanisms	38.5	350
19	Mixed cultivars and barley induced resistance	28.9	263
20	Sustainable forage legumes towards environmental and cost efficient milk production	35.8	325
21	Cadmium content in spring wheat as affected by legumes in the crop rotation	18.3	167
22	Robust and cost-effective automation of mechanical weed control for the cultivation of organically grown sugar-beets	46.8	425
23	Biofumigation for control of soilborne fungi in sugar beets	62.3	567
24	Odours for control of aphids in glasshouse production	38.5	350
25	Non-chemical weed control in orchards	19.8	180
26	The seed treatment agents in cereals and their effects	22.0	200
27	Preventive measures against with disease in oilseed rape based on introducing antagonistic micro-organism	55.0	500
28	Vitamins in organically grown forage legumes and grasses	46.8	425
29	Influence of application technology on the effect of oil and/or soap when used against pests in production of fruit and berry	42.4	385
30	Evaluation of biocontrol agents for control of root diseases in closed hydroponic systems	100.1	910
31	Bioinsecticides – biological control of pest insects with insect pathogenic fungi	33.0	300
32	Developing alternative control measures against potato late blight	55.0	500
VI	**Food systems**		
33	Characterization of raw milk from sustainable production systems	18.1	165
34	Effect on milk quality as a consequence of the legislation against use of synthetic vitamins in organic dairy production	17.1	155
35	Impact or grown conditions on quality of vegetables regarding concentration of health-promoting and toxic secondary metabolites	33.0	300

36	Vitamins in milk from organic conventional dairy farms	18.2	165
37	Development of a research programme for the study of local and regional food	20.9	190
38	Factors of success for regional foods	55.0	500
VIII	**Knowledge management**		
39	Environmental performance indicators for the dairy farm	49.5	450
40	Exploring the theory and practice of participatory research in Swedish agriculture	6.6	60
41	Development of indicators for biodiversity and energy on farms with ecological and integrated production	24.8	225

(1 SEK = 0.11 EUR)

CORE Organic Country Report

Country Report on Organic Farming Research in Switzerland

Prepared by Thomas Alföldi[1], Urs Niggli[2], Helga Willer[3], Padruot Fried[4], Fredi Strasser[5], David Dubois[6], Daniel Baumann[7], Robert Kaufmann[8], Peter Gallmann[9], Raphael Charles[10]

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7 Dr. Daniel Baumann, formerly Agroscope Changins Wädenswil ACW, P.O. Box 185, CH - 8820 Wädenswil, http://www.faw.ch

8 Dr. Robert Kaufmann, Agroscope FAT Tänikon Tänikon, CH - 8356 Ettenhausen, http://www.fat.ch

9 Dr. Peter Gallmann, Agroscope Liebefeld-Posieux (ALP), Schwarzenburgstrasse 161, CH - 3003 Bern, http://www.alp.admin.ch/

10 Dr. Raphael Charles, Agroscope Changins Wädenswil ACW, Route de Duillier, CH - CP 1012 Nyon, http://www.racchangins.ch

Photo: Forschungsinstitut für biologischen Landbau

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1 History

Switzerland has a long history of organic farming research, which in its beginnings has been carried out by organic farming pioneers and by private institutions like the Goetheanum, Möschberg Centre and the Research Institute of Organic Agriculture (FiBL). It was in the 1990s, when Swiss Federal Agricultural Research Stations (Agroscope) became also involved in organic research topics. In the following, the milestones of organic research history are listed.

1924 First biodynamic research activities at the Goetheanum in Dornach, Switzerland

1950s Activities of Hans-Peter Müller, the pioneer of organic-biological farming, at the Möschberg Centre for organic farming

1973 Private Research Institute of Organic Agriculture (FiBL) founded

1977 First Scientific Conference of the International Federation of Organic Agriculture Movements (IFOAM) held in Sissach

1978 Start of the DOK long-term trial[1] at FiBL in cooperation with Swiss Agricultural Research Station Agroscope

1984 Start of official experiments of Agroscope FAL on organic farms

1985 First financial contribution to FiBL by the Swiss Federal Office of Agriculture (FOAG)

1988 First lectures at Swiss Federal Institute of Technology Zurich (ETHZ)

1989 Increased funding of FiBL by the Swiss Federal Office of Agriculture (FOAG)

1990 First standards for organic milk processing and food packaging in cooperation with Swiss Agricultural Research Stations

1994 First four-year mandate to FiBL (the so-called "Leistungsauftrag") by FOAG

1995 Start of Research Coordination Group between Agroscope and FiBL

1998 Second four-year mandate to FiBL by FOAG

2000 The 13th Scientific Conference of the International Federation of Organic Agriculture Movements (IFOAM) takes place in Basel

2000 Agroscope Centres comprising five Federal Agricultural Research Stations become increasingly involved in organic research projects

2001 *Peer Review*: Evaluation of research and technical development on organic farming in Switzerland (Prof. Dr. R. Zanoli)

2002 Science Paper on soil fertility and organic farming based on the results of the DOK trial published by authors of FiBL and Agroscope

2002 Third four-year mandate to FiBL by FOAG

2003 Restructuring of organic research coordination group, new mandate

2004 First national conference of the research coordination group FiBL Agroscope, now taking place annually

[1] DOK stands for Dynamisch – Organisch – Konventionell; i.e the trial compares biodynamic (D) with organic (O) and conventional (K) variants.

2 Organisation

The Research Institute of Organic Farming (FiBL)[2] is a private trust and has been active in organic farming research and dissemination since 1973.

The three Federal Research Stations "Agroscope[3]**"** have become increasingly involved in organic research projects since the year 2000.

- Agroscope Reckenholz Tänikon ART; merger of Agroscope Zürich-Reckenholz (FAL) and Agroscope Tänikon (FAT)
- Agroscope Changins Wädenswil ACW; merger of Agroscope Wädenswil (FAW) and Agroscope Changins (RAC)
- Agroscope Liebefeld-Posieux (ALP).

These Federal Research Stations are doing applied research for a sustainable and multifunctional agriculture and are running numerous research projects specifically dedicated to Organic Food and Farming.

A group, the Organic Research Coordination Group, coordinates FiBL's and the Federal Research Stations' activities. In 2004, an annual conference was established, documenting the current status of organic farming research at these institutes[4].

In addition, there are two private research institutes, which are specialised in biodynamic research activities: the Agricultural Department of the Goetheanum[5] and the Cereal Breeding Group of Peter Kunz[6].

2.1 Research Institutions

Public and private research institutions active in organic farming research are listed in table 1. The distribution on research and extension activities on organic farming between Agroscope and FiBL is shown in figure 1.

[2] Forschungsinstitut für biologischen Landbau / Research Institute of Organic Farming (FiBL), CH-5070 Frick, www.fibl.org

[3] Agroscope comprises the Swiss agricultural research stations, http://www.agroscope.ch/inde.html

[4] The proceedings of the 2004 and the 2005 conferences are available at http://orgprints.org/4845/ and http://orgprints.org/2493/

[5] Sektion für Landwirtschaft am Goetheanum / Section for Agriculture at the Goetheanum, CH-4143 Dornach, http://www.sektion-landwirtschaft.org

[6] Getreidezüchtung Peter Kunz / Cereal Breeding Group of Peter Kunz, CH - 8634 Hombrechtikon, http://www.peter-kunz.ch/

Table 1: Overview on public and private research institutions in Switzerland

Institution	Financing	Contact	Remarks
Research Institute of Organic Farming (FiBL)	Public and private	Dr. Urs Niggli, Director FiBL Thomas Alföldi, Coordinator and FiBL-representative in the Joint Research Coordination Group Agroscope and FiBL	FiBL is a private trust, active in organic farming research and dissemination since 1973. Overall budget in research and knowledge transfer for organic farming: € 10 Mio. 110 scientific and technical staff. Branch offices in Germany and Austria (FiBL Germany, FiBL Austria) with independent national budgets. www.fibl.org
Agroscope ART Reckenholz	Public	Fredi Strasser, Coordinator and representative in the Joint Research Coordination Group Agroscope and FiBL Padrout Fried, President of the Joint Research Coordination Group between Agroscope and FiBL	Swiss Federal Research Station for Agroecology and Agriculture FAL- Reckenholz has a mandate to cover field crops and grassland systems in Organic Farming. Scientists are located in the different research groups of FAL. 270 scientific and technical staff; annual budget of € 20 Mio A joint Research Coordination Group led by Padruot M. Fried ensures co-ordination between FiBL and Agroscope Centres. www.reckenholz.ch
Agroscope ART Tänikon	Public	Dr. Robert Kaufmann, Representative in the Joint Research Co-ordination Group Agroscope - FiBL	Swiss Federal Research Station Tänikon deals with issues of agricultural efficiency and engineering in agriculture. About 90 scientific and technical staff, overall budget of € 9 Mio. www.fat.ch
Agroscope ACW Wädenswil	Public	Peter Gut, Representative in the Joint Research Coordination Group Agroscope - FiBL	Swiss Federal Research Station for Horticulture, Research and Extension for integrated and organic fruit- and vegetable production, viniculture, food and beverage technology. 150 scientific and technical staff, overall budget of € 11 Mio. www.faw.ch
Agroscope ACW Changins	Public	Dr. Raphael Charles, Representative in the Joint Research Co-ordination Group Agroscope - FiBL	Swiss Federal Research Station Changins (French speaking part of Switzerland) works on all types of research for plant production: field crops and grassland, plant breeding and genetic resources, viniculture, vine and analytic chemistry, berries, medicinal plants, greenhouse crops, regional aspects of horticulture and arboriculture, plant protection, weed science, plant nutrition, biotechnology. www.racchangins.ch
Agroscope ALP Liebefeld-Posieux	Public	Dr. Peter Gallmann, Representative in the Joint Research Co-ordination Group Agroscope - FiBL	Swiss Federal Research Station for Animal Production and Dairy Products, research and extension for integrated and organic life stock production, milk production and beekeeping, processing, quality and technology of organic milk products, meat products and bee products, development and production of organic starter cultures for cheese and other fermented food. www.alp.admin.ch
Section for Agriculture at the Goetheanum	Private	Nikolai Fuchs	Research on biodynamic agriculture www.sektion-landwirtschaft.org
Cereal Breeding Peter Kunz	Private	Peter Kunz	www.peter-kunz.ch

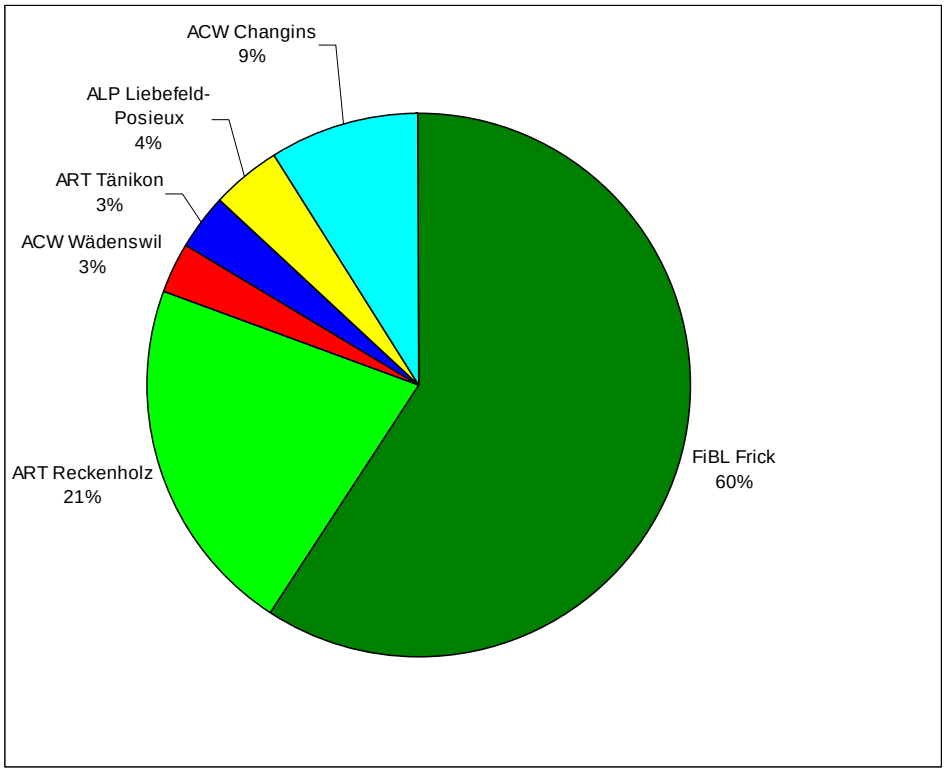

Fig. 1: Distribution of total manpower on research and extension activities by all Swiss Research Stations (Agroscope and FiBL). Total amount of manpower for organic farming is 20,424 working days per year. Data is based on calculations of the Joint Research Coordination Group FiBL-Agroscope for the work programme period 2004-2007.

2.2 Financing organisations

It can be estimated that currently approximately € 7.5 million per annum are allocated very specifically to organic farming research from public budgets. The major part of the state funding for organic farming research is granted by the organisations listed in table 2.

Table 2: Overview of Swiss financing organisations for organic farming research and dissemination

Financing Organisation	Euro per annum	Remarks
Federal Office for Agriculture (FOAG) www.blw.admin.ch/	7 million €	Via permanent staff of Agroscope Centers and grant to FiBL
Swiss Federal Veterinary Office (SFVO) www.bvet.admin.ch	350'000 €	Grant to FiBL
State Secretariat for Education and Research (SER) http://www.sbf.admin.ch/	800'000 € (not to be considered as national public funding)	Until recently the funding for Swiss partners in projects of the European Research Framework programmes came directly from Switzerland (SER). Now these monies are distributed via the European Commission in Brussels
Cantonal Governments in Agricultural Schools and in Extension Services incl. Swiss College of Agriculture in Zollikofen	1 million € (estimate)	Teaching and extension in organic farming are general cantonal duties

3 Mapping research programmes (research topics)

3.1 Which programmes have been carried out and which research programmes are currently being undertaken?

The National Research Programme is organised according to a four-year research concept of the Swiss Federal Office of Agriculture (FOAG). Within this concept, organic farming is considered as an important issue of Swiss agricultural research, and research for organic farming is carried out as a continuous process. The Research Institute of Organic Farming (FiBL) is doing research exclusively for organic farming, whereas at the Federal Agricultural Research Stations research for integrated and organic farming is carried out in parallel. Together with the activities of FiBL, all relevant agricultural topics such as plant production, animal health and husbandry, food quality and socioeconomics are covered and carried out in the context of organic farming. Research is organised as

a) A mandate of € 3.5 Mio annually to FiBL (the so-called "Leistungsauftrag" by the Swiss Federal Office of Agriculture (FOAG) and the Swiss Federal Veterinary Office (SFVO) and

b) As a priority setting within the three Federal Agroscope Centres (further details see chapter 6).

3.2 Tentative description of covered subjects

An overview on the distribution of all research and dissemination topics for organic farming covered by the three Agroscope Centres and FiBL is given in figure 2. The categories for the topics are based on the categories proposed by www.orgprints.org. Figure 3 and 4 show the distribution between the Agroscope Centres and FiBL regarding the main topics and subtopics respectively[7].

- FiBL covers soil management and plant nutrition, horticultural crop research, organic seed production, organic plant protection and biodiversity, livestock health, livestock breeding and ethology, socio-economics including policy, regulation and markets, as well as food quality
- Agroscope ART Reckenholz covers soil management and plant nutrition, grassland and arable crop research, breeding of fodder crops, biodiversity, plant protection and landscape
- Agroscope ACW Changins covers grassland and arable crops research, breeding of arable crops and vine, variety testing, horticultural crops especially aromatic plants
- Agroscope ALP covers milk and meat quality/technology/processing
- Agroscope ACW Wädenswil covers fruit- and vegetable production, viniculture, crop protection, breeding/variety testing, quality and processing research
- Agroscope ART Tänikon covers farm management, farm technology and animal husbandry

[7] Most of the current research projects carried out by Agroscope and FiBL are described in the Organic Eprints Archive at http://orgprints.org/view/projects/ch-agroscope.html and http://orgprints.org/view/projects/fibl.html.

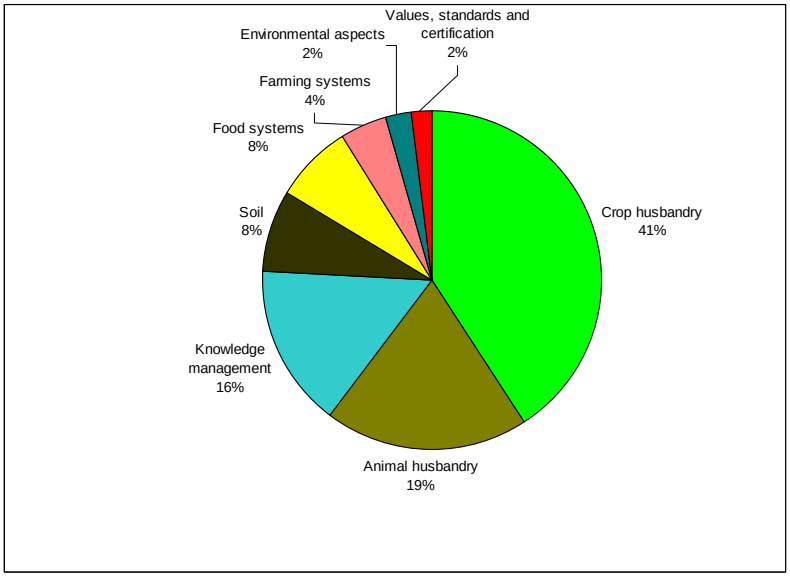

Fig. 2: Distribution of manpower for main research topics covered by all Swiss Research Institutions Agroscope and FiBL. Total amount of manpower for organic farming activities is 20,424 working days per year. Data is based on calculations of the Joint Research Coordination Group FiBL-Agroscope. Categories according to www.orgprints.org.

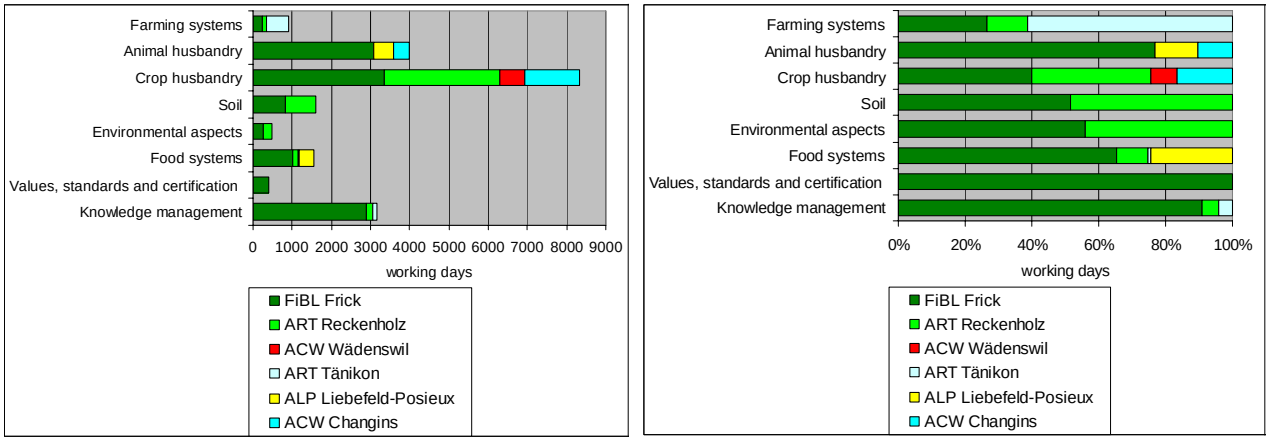

Fig. 3: Working days per year for main topics covered by the Swiss Research Stations Agroscope and FiBL (left) and relative distribution (right). Data is based on calculations of the joint Research Coordination Group; working programme 2004-2007; categories according to www.orgprints.org.

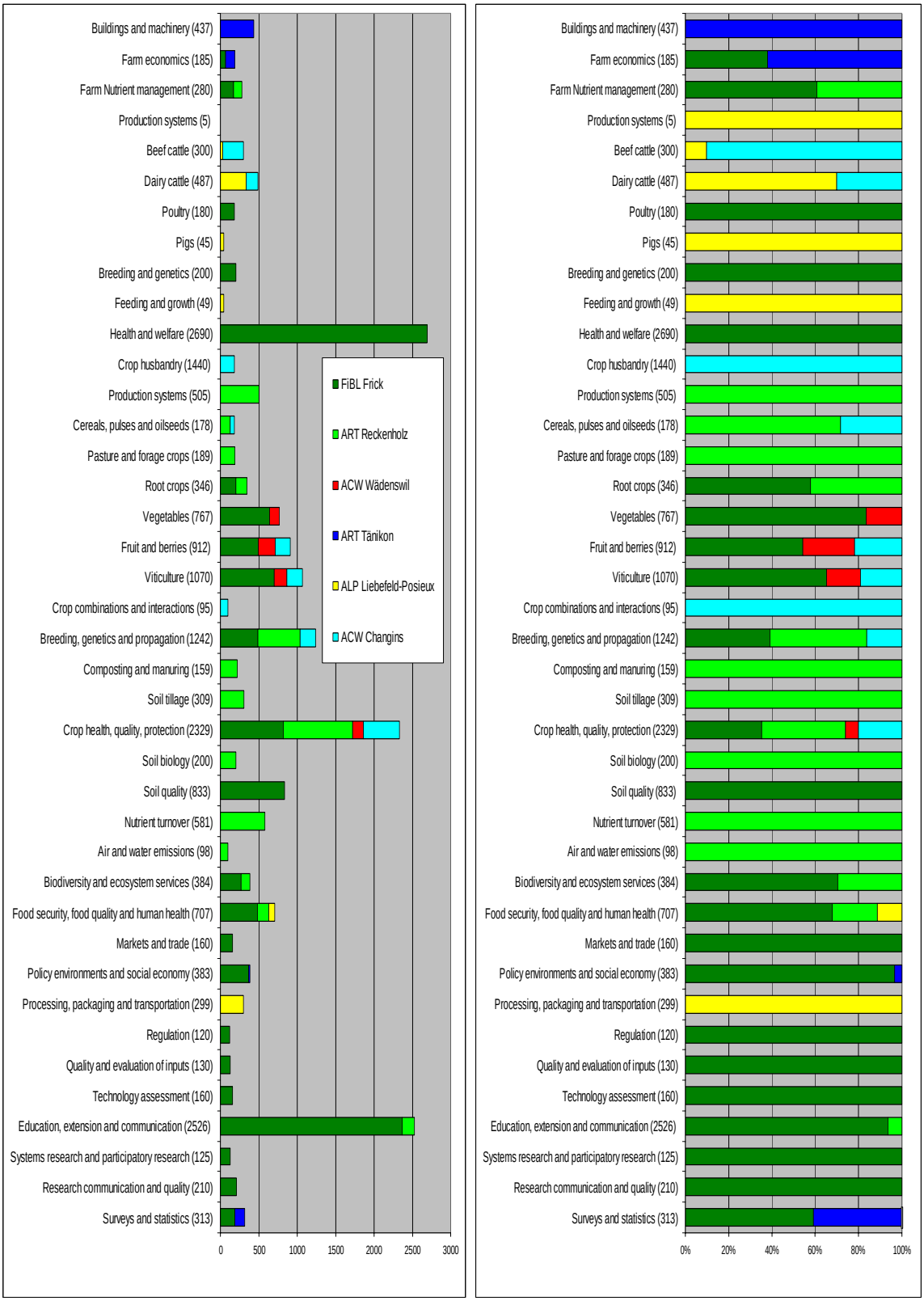

Fig. 4: Working days per year for all main and subtopics covered by the Swiss Research Stations Agroscope and FiBL (left) and relative distribution (right). Data is based on calculations of the joint Research Coordination Group; working programme 2004-2007; categories according to www.orgprints.org.

3.3 Actual spending (€) per subject

An estimate of the actual spending in Euro per year and subject is shown in figure 5. The total amount is approximately € 11 million per year. It can be estimated that approximately € 7.5 million per annum are presently allocated from public budgets. The rest originates from private funding sources (see also chapter 2.2).

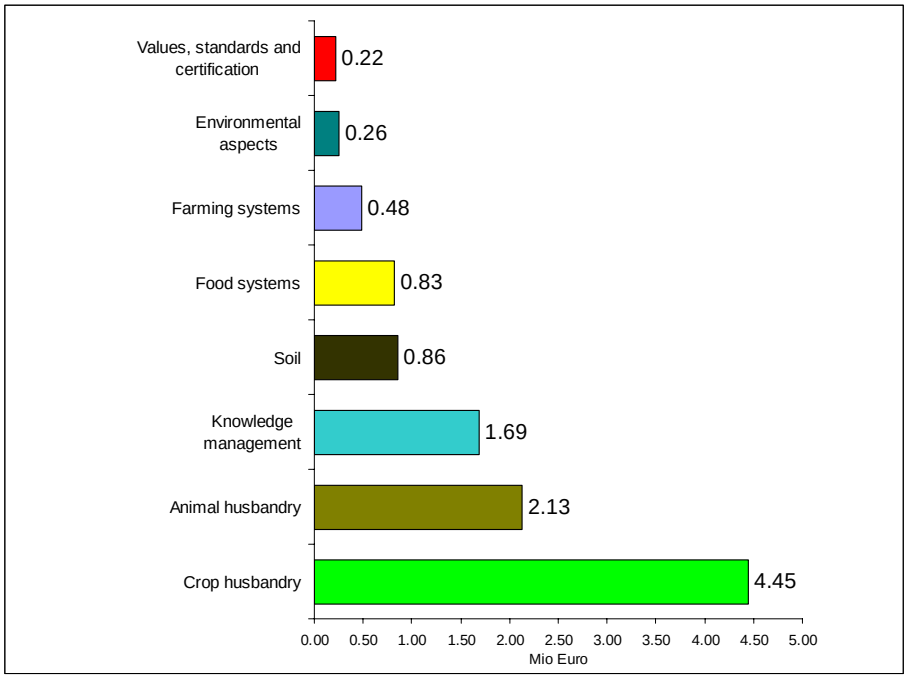

Fig. 5: Estimate of actual spending in million Euro per year for all main topics covered by the Swiss Federal Research Stations Agroscope and FiBL. Calculation is based on working days per year multiplied by 533 Euro per day. Data source: Joint Research Coordination Group; working programme 2004-2007; categories according to www.orgprints.org.

4 Financing

Table 3: Public and private financing based on 533 Euro (800 CHF) per working day

Institution	Percentage of total research	Total working days per year	Total funding Mio Euro	Public funds Mio Euro	Private funds, Mio Euro
FiBL	60	12'000	6.4	3.0	3.4
ART Reckenholz	21	4'200	2.2	2.2	
ART Tänikon	3	600	0.3	0.3	
ACW Wädenswil	3	700	0.3	0.3	
ACW Changins	9	1'800	1.0	1.0	
ALP	4	800	0.4	0.4	
Total	100	20'000	10.3	7.3	3.4

5 Research facilities

Agroscope Research Stations and FiBL have all facilities required for modern up-to-date research. The relevant facilities are listed for each institution in tables 4-9.

Table 4: Research facilities of Agroscope Zurich-Reckenholz (ART Reckenholz)

Type	Location	Further details
Laboratory	ART Reckenholz	State-of-the-art facilities
Greenhouses, growth cabinets	ART Reckenholz	State-of-the-art facilities
Long-term field experiment DOC-trial (together with FiBL),	Therwil	Long-term replicated field trial (DOK) since 1978
Organic plots for trials on neighbouring organic farms	ART Reckenholz	Six ha arable land of two neighbouring organic farms for experimentation under organic conditions
Experimental farm	Alberswil , Agrovision	Monitoring of organic and integrated farming since 1997
On-farm trials	On-farm trials on about 25 organic farms	Variety testing and improvement of performance of organic grassland and arable farming

Table 5: Research facilities of Agroscope Wädenswil (ACW Wädenswil)

Type	Location	Further details
Laboratory facilities	ACW Wädenswil	State-of-the-art laboratory facilities for pathology, entomology, nematology, microbiology, soil, plant and food related research; state-of-the-art facilities for chemical analysis and molecular biological research
Facilities for food and beverage processing technology	ACW Wädenswil	State-of-the-art technological facilities for food and beverage processing, microbiological and molecular biological research in beverage processing, experimental distillery
Greenhouse and climate chambers	ACW Wädenswil	State-of-the-art greenhouse and climate chamber facilities
Storage facilities	ACW Wädenswil, Güttingen	State-of-the-art facilities for storage research (climate chambers, controlled atmosphere)
Experimental farm	ACW Wädenswil, Wintersingen, Güttingen	Three experimental farms for fruit-, vegetable production and viniculture, variety trial facilities, certified weather recordings
Experimental farm	ACW Wädenswil	Nuclear stock for virus free plant material, insect-free growing facilities
On-farm research facilities	Various locations all over Switzerland	Variety trials, crop protection experiments, monitoring experiments, long-term research, full factorial trials
Farm network	Various locations all over Switzerland	Farm network for economic research in fruit production

Table 6: Research facilities of Agroscope Liebfeld-Posieux (ALP)

Type	Location	Further details
Experimental farm	Sorens	140 ha organic farmland, 75 dairy cows, 100 young cattle an heifers; owner is the Canton of Fribourg; main focus: comparison of different grazing intensities and complementary feeding
Experimental farm	Posieux	67 ha farmland with integrated production (IP), 80 dairy cows (12 fistulated), suckler herd, 80 sows, 240 weaning, growing and finishing pigs; sheep; metabolic cages for cows, sheep and pigs; feed plant; abattoir; automatic feeding systems for the livestock
Experimental apiary	ALP Liebefeld	80 to 120 organically managed experimental hives, main focus on varroa control, as well as European and American Foul Brood
Experimental cheese plant	ALP Liebefeld	Production of eight experimental cheeses per day of about 10 kg. Quality control of lactic acid starter. Development of new products
Experimental cheese plant	ALP Uettligen	Production of up to five emmental cheeses (80-100 kg) each day. Upscaling of the results from the experimental pilot plant Liebefeld. Quality control of lactic acid starter
Starter culture production plant	ALP Liebefeld	Production of 31 organic and 14 non-organic cultures used in different dairy products for starter, additional, surface or ripening purposes. Production of 100,000 units/year exclusively for Swiss Dairies and cheese factories
Experimental dairy plant	ALP Liebefeld	Pilot plant for process technologies (heating, filtration, separation, drying)
Experimental meat laboratory	Spiez	Education centre for the Swiss meat industry. Pilot plant for meat processing. Cooperation contract for meat research with Agroscope Liebefeld-Posieux
Laboratories	ALP Liebefeld	State-of-the-art laboratories for chemical, biochemical, microbiological, physical and sensory analyses of milk, dairy products, bee products and auxiliary substances for the dairy industry and beekeeping; national reference laboratories for milk, milk products and bee products; accredited test laboratories according to ISO 17025
Laboratories	ALP Posieux	State-of-the-art laboratories for chemical, biochemical, microbiological and GMO analyses of feedstuff; chemical, biochemical, microbiological, physical and sensory analyses of meat; biochemical, clinical and physical analyses of blood and muscles; accredited test laboratories according to ISO 17025

Table 7: Research facilities of Agroscope Tänikon (ART Tänikon)

Type	Location	Further details
Experimental farm	ART Tänikon	Experimental farm for animal-, crop- and greenland-production, 110 ha, 60 cows, 50 sows, for different trials in barn, field and construction
Test facilities	ART Tänikon	Test bench for tractors and hay storage blower
Support services	ART Tänikon	Workshops for development of measurement systems and constructions
Farm network	Various locations all over Switzerland	Farm network for economic research. Database of about 3000 accounts closing; on-farm research according to goals of projects (over 50/year)

Table 8: Research facilities of Agroscope Changins (ACW Changins)

Type	Location	Further details
Laboratory, field experiments, on-farm research	ACW Changins and outer locations	Expertise in field crops and grassland: plant and reproductive growth, agronomic value and quality of varieties, dairy cattle and mountain grazing systems
Laboratory, field experiments	ACW Changins and outer locations	Expertise in genetic resources of cultivated plants: biodiversity and genetic resources, disease elimination, healthy plant material propagation, material conservation
Laboratory, field experiments, on-farm research	ACW Changins and Pully, outer locations	Expertise in viniculture: plant and reproductive growth, agronomic value and quality of varieties, vine
Laboratory, field experiments	ACW Changins and outer locations	Diagnostic of pests, of fungal, bacterial and virus diseases, plant protection
Laboratory, field experiments, on-farm research	ACW Changins and Conthey, outer locations	Expertise in berries, medicinal plants, greenhouse crops, regional aspects of horticulture and arboriculture: plant and reproductive growth, agronomic value and quality of varieties

Table 9: Research facilities of FiBL

Type	Location	Further details
Laboratory	FiBL, Frick	State-of-the-art laboratories for plant pathology, entomology and soil, plant and food related research
Long-term field experiment DOK[8]	Therwil	Long-term replicated field trial comparing farming systems since 1978, on-going (DOK-trial)
Long-term field experiment "Präparateversuch"[9]	FiBL, Frick	Long-term replicated trial comparing effects of soil management, fertilisation systems and biodynamic preparations since 2001, on-going
Long-term field experiment compost fertilisation	Walenstadt und Malans	Long-term trial comparing compost fertilisation on vine grapes; since 1996, on-going
Long-term soil monitoring[10]	Rheinau	Monitoring of soil parameters during the conversion process of integrated to biodynamic farming
Experimental farm FiBL Frick	FiBL, Frick	"FiBL-Hof" 30 ha pasture, arable crops, milk cows, pig-breeding, chicken
Experimental site Viniculture	FiBL, Frick	Vinicultural research focussing on plant protection strategies, cultivation techniques, variety testing including microvinification
On-farm trials arable crops	22 organic farms	Variety testing of winter wheat, potatoes and corn demonstration trial, since 1999, on-going
On-farm trials tree nutrition	Remigen	Full factorial long-term trial on apple tree nutrition concepts, since 2000, on-going
On-farm trials fruit	23 on-farm locations	Precision trials for fruit tree and grape nursery; variety testing for apples, pears, cherries and plums, precision trials and on-farm ring trials; long- term effects of biodynamic vine growing; root stock trial for apple growing; farm net to provide apples for quality research
Farm network[11]	3 regions with each 15-20 organic farms	Farm network for socio-economic research and extension, since 2004 on-going
Farm network Pro-Q[12]	80 organic dairy farms	Improving udder health of organic dairy cows (Project Pro-Q)

6 Initiation of research and stakeholder engagement

6.1 How are new research programmes initiated?

Neither the research mandate for FiBL, nor the priority setting of the Agroscope Centres (see chapter 3.1) are organised as an open call process for funding. Research priorities are set for a four-year period within each research station of Agroscope and FiBL according to the existing repartition of research areas. Priority setting and the development of the research project portfolio

[8] http://www.orgprints.org/6259
[9] http://www.orgprints.org/6203
[10] http://www.orgprints.org/6258
[11] http://www.orgprints.org/5911
[12] http://www.orgprints.org/6281

is performed in a four-year cycle as an open call process where besides the researchers also farmers, advisory services, as well as consumers can contribute.

For specific extension projects, Agroscope ACW Wädenswil operates an annual open call process involving all stakeholders.

Overall coordination of the projects in organic research is done in the Research Coordination Group Agroscope – FiBL, which meets at regular intervals.

6.2 How are stakeholders engaged in the initiation?

There is no official common platform for stakeholder engagement in the initiation of research of organic topics in Switzerland. However, for prioritisation and initiation of research projects, all research institutions are in continuous contact with the stakeholders on individual levels. The long- and mid-term research portfolios are regularly analysed at each research station by an advisory board, representing aspects of organic production as well. Research programmes include also externally funded projects (EU, COST, etc.).

In order to prioritise the state funded organic research activities at both FiBL and the Federal Research Stations Agroscope, the Joint Coordination Group will intensify stakeholder dialogue from 2006 onwards. The outcome will be used for the next research programme 2008 to 2011.

At Agroscope ACW Wädenswil, stakeholders are actively involved in the open call process for so-called extension projects. Branch specific research forums including representatives from organic production take part in the coordination and priority setting for the extension project portfolio. Through this collaboration ACW Wädenswil extension activities are, although funded by the government, 100% driven by the respective branches (fruit production, vegetable production, viniculture).

For FiBL, stakeholders contact is as follows:

- The Swiss umbrella organisation of organic farmers Bio Suisse is organised branch-wise with committees and working groups (e.g. dairy production, egg and poultry, meat, wheat, fruit, vine, vegetable production, but also questions of labelling, processing, import/export, certification procedure, market development and agro-policy). Scientists and advisors of FiBL are involved as independent experts in these stakeholder panels. These groups discuss continuously research needs and research priorities
- The Board of Directors of Bio Suisse decides annually on the thematic priorities of a research assignment given to FiBL
- FiBL's Board of Trustees, which is responsible for the strategic decisions of the FiBL programme represents the most important stakeholder groups
- Important inputs to research are given by FiBL advisors. They perceive research needs of agricultural practice through their continuous contact with farmers, other advisors colleagues and their work in expert commissions of the organic producers' organisation Bio Suisse
- FiBL's activities are very much user-driven, as more than 50 % of the funding comes from the organic industry

7 Selection criteria and evaluation procedures

As there are no open calls for state funded organic research activities (see chapter 6.1), no official evaluation criteria for the selection process are used. The development of the research project portfolio is primarily based on the overall research strategy of each research station. The potential of high quality projects meeting the strategic objectives are evaluated for its stakeholders benefits and availability of core competence. Extension projects, as at Agroscope ACW Wädenswil, however, are selected by the stakeholders research forums mentioned above. Urgency and relevance of problem solving together with a cost-benefit analysis are the most important selection criteria.

Evaluation is realised by an annually reporting system based on the mandate (Leistungsauftrag) and every second year an activity report is published. In 2001, an external peer review evaluated focus and deliverables of the research projects. Furthermore, individual donors, especially in the case of FiBL, are continuously evaluating the projects.

8 Utilisation of research

an overview on different organisations and institutions offering different forms of dissemination activities in Switzerland is given in table 10. An estimate of the importance is also indicated.

Table 10: Different types of dissemination activities for farmers offered by Swiss Institutions

	Organisation (abbreviations are explained below)								
Dissemination type	FiBL	BS	MOs	IB	LBBZ	LBL	SRVA	FA	Other
Single farm advice	X	x		X	X				X
Group advice	X				X			X	
Advice by phone	X	X		X	X	X	X	X	X
Further education courses	X	X	X		X	X	X	X	X
Technical leaflets	X	X				X	X	X	
Mailing		X	X					X	X
Bio aktuell, the magazine for Swiss organic farmers	X	x							
Journal articles	X	X	X	X	X	X	X	X	X
Internet	X	X	X	X				X	X

Abbreviations

- FiBL: Research Institute of Organic Agriculture / Forschungsinstitut für biologischen Landbau
- BS Bio Suisse: Umbrella organisation of the Swiss organic organisations; owner of the bud-label
- MOs: Member Organisations of Bio Suisse
- IB: Inspection bodies Bio.Inspecta AG und Bio Test Agro
- LBBZ: Agricultural education and training centres
- LBL: Agricultural Advisory Service in the German speaking part of Switzerland
- SRVA Agricultural Advisory Service in the French speaking part of Switzerland
- FA: Federal Research Stations Agroscope
- Other: Organic marketing associations, private companies and consultancy firms

9 Scientific education & research schools

Table 11: Specific courses on organic farming at university and technical university level

Institution	Course
Swiss Federal Institute of Technology Zurich (ETHZ)	Introduction to organic farming
	Case studies organic and integrated farming
	Comparing low-input and organic farming systems
	Marketing
	Vegetable production systems (including aspects of organic production)
	Fruit production systems (including aspects of organic production)
University of Applied Sciences FH Zollikofen	Introduction to organic farming
University of Applied Sciences FH Wädenswil	Various courses (including aspects of organic production)

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Sharing and developing best practice for the evaluation of research in organic food and farming



Work package 5

Thomas Alföldi, Urs Niggli and Bertil Sylvander (2006):
Sharing and developing best practice for the evaluation of research in organic food and farming (OF&F)

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Content

1 Introduction

The aim of this survey is to provide insight into the organisation of organic food and farming research by the partners involved in the CORE organic project, in order to evaluate and improve it. This report will therefore show how *priority setting, procurement/funding and evaluation for organic farming research* are organised in the eleven participating partner countries. A questionnaire consisting of eight parts was sent to the partners. The first part is asking about the organisation of organic farming research emphasising on the question, whether an organic research programme exists or whether organic farming research is integrated in a more general scheme. Second part looks at the organisation of organic programmes and the priority setting process. Third part contains detailed questions dedicated to the different steps of open calls. Reporting and monitoring of the projects and programmes is dealt with in the fourth part. In the fifth part, the focus lays on how the ex-post evaluation is organised followed by chapter six asking for the different dissemination activities. Proposals on how the procedures could be optimised in the different countries are made in the seventh part. And the last part contains specific questions on how the eleven countries deal with interdisciplinarity, grass root research, and scientifically controversial methods.

The presentation of the results follows the order of the questionnaire. In order to make it easier for the reader, in the following text the countries are mentioned instead of the CORE organic partners. However, all statements refer to the CORE organic partners as follows:

Country	**CORE Partner**
Austria AT	Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
Denmark DK	Danish Directorate for Food, Fisheries and Agri Business (DFFAB) & Danish Research Centre for Organic Farming (DARCOF)
Finland FI	Ministry of Agriculture and Forestry (MMM)
France FR	Ministry of Agriculture (MAAPAR) & National Institute for Agricultural Research (INRA)
Germany DE	Federal Ministry of Consumer Protection, Food and Agriculture (BMVEL) & Federal Agency for Agriculture and Food (BLE)
Italy IT	Ministry of Agriculture and Forestry (MiPAF)
Norway NO	The Research Council of Norway (RCN)
Sweden SE	Swedish Research Council for Environment, Agricultural Science and Spatial Planning (Formas)
Switzerland CH	Swiss Federal Office for Agriculture (FOAG)
The Netherlands NL	Ministry of Agriculture, Nature and Food Quality (MinLNV)
United Kingdom UK	Department for Environment, Food and Rural Affairs (Defra)

2 Results of the questionnaire

2.1 General Questions: Frequency of open calls differs

In six out of eleven countries (DE, DK, IT[1], NL, SE, UK), organic research projects are part of an organic programme (Table 1). In four countries (AT, CH, FI, NO) organic research projects are integrated in a more general scheme[2]. In FR both schemes are used.

Open calls exist in the Scandinavian countries DK, FI, NO and SE as well as in FR and UK[3]. In other countries like CH most of the grants are dedicated to institutions, and only a small part of the grants are open for calls. In NL, no open call but a semi-closed call exists. There is no correlation between the existence of an organic programme and an open call.

Three groups can be identified regarding the time period since open calls exist. The first open calls were established in the early nineties in AT, FI, NO, UK followed by DK, SE in the mid-nineties, and most recently by DE, FR, IT, NL. CH had open calls in the first and last group.

In five countries open calls are not regularly set calls (CH, DE, IT, NL, UK). FR and the Scandinavian countries DK, FI, NO, SE have regular calls with a frequency of 1 to 4 calls per year, up to 1 call every 4 or 5 years in DK. AT and IT have a system where continuous submission is possible. UK procures organic R&D through open competition regularly depending on the need.

Table 1: General questions

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
ORP in organic programme (org) or integrated in general scheme (int)?	int	int	org	org	int	Both	org	org	int	org	org
Open calls?	partly	partly	partly	yes	yes	Yes	partly	no	yes	yes	yes
Open calls since?	1991	1990/2004	2002	1996	1992	2001	2002	2002	1992	1997	1991
Frequency and schedule of the call?	cont	nr	nr	4-5y	1y	2y	nr	nr	1y1)	3y	nr

Abbreviations: **ORP:** Organic research projects; **Cont:** Continuous submission during duration of the programme possible; **nr:** not regularly set calls; x **y:** every x years 1) Up to four times a year

[1] Some Italian projects in 2002 have been financed under the National Research Plan on Organic Farming. In December 2005 Italy adopted a new general Action Plan and a derived Programme, indicating objectives and actions for the whole OF&F sector, but not only research (policy programme).

[2] „Organic programme“ means that bodies in charge of research set up a specific programme, with signposted funding, while the general scheme means that organic research has to compete with other research fields.

[3] In UK, Defra uses also other ways to procure research.

2.2 Programme and priority setting: Different levels of formalisation

All countries, except AT IT[4] and NO, have a specific programme committee (Table 2).

In most countries, programme committees are composed by research users and research providers[5] (DE, DK, FI, SE, NO) In NO they are composed of research users only, and in FR they are composed by research providers only. In UK, the committee is composed of external experts, research users and research providers.

The methods for priority-setting are described by some countries as an informal consultation process involving mainly research users and in AT, FR, NO, DE also involving research providers. For AT, DE, FR, IT, NL, and SE the consultation process seems to be more formal and comprises a two-step process. DK and SE also mention a congress and a workshop respectively as an important opportunity for dialogue with research users. For CH such a workshop is planned for 2006.

Table 2: Programme and priority setting

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Organic programme committee?	no	yes	yes	yes	yes	yes	no	yes	no	yes	yes
Members of the programme committee?	-	RU	RU RP	RU	RU	RP	-	RU MI	RU	RU MI	RU RP EXP
Which methods for priority setting?	Cons RU RP	Cons RU	2-step Cons RU RP MI	Cons RU+ WS	Cons RU	Cons RU Input RP	Cons RU MI RP	2-step Cons RU	Cons RU RP MI	2-Step Cons +WS RU	Cons RU RP MI

Abbreviations: **RP:** Research providers; **RU:** Research users **MI:** Ministry;
Cons: Consultation process involving...; **WS** Workshop

2.3 Open calls: No evaluation criteria specifically for OF&F

The open calls are issued in most countries by the ministries or research councils. Exceptions are DK, FR and SE where the research institutions issue the calls. Most countries give the possibility to submit a shorter pre-proposal or expression of interest and after this has been approved the full proposal can be submitted in a second step. AT, FI and NO use a one-step application procedure. Three countries use both procedures (IT, SE, UK). The evaluation expert panels are in most cases composed by research providers, research users and staff of the ministries according to the needs of the different projects. CH, FI, NO and UK use external (foreign) peers. Only DK has a permanent evaluation group.

The final decision is taken in most countries by the responsible department of the ministry or research council. Exceptions are FR and SE (DGER and Formas).

Seven countries use a combination of written form and panel discussion for the evaluation process. The duration of the evaluation process differs considerably within a range of 3 weeks (AT, CH, NL)

[4] Italy has a consultant committee on OF&F, asked for advice to define plan and programme on OF&F.

[5] Research users include farmers, advisors, policy makers, processing industry, distributers, marketing sector, and consumers. Research providers are scientists. Research users and research providers together are defined as stakeholders.

up to 40 weeks (FR). In most countries the proposals may be modified based on the evaluation. However, some countries indicate, that this is only possible for projects which are evaluated positively.

The fact that open calls may sometimes be combined with a more specific procedure including seminars and panel discussions means that in special fields like Organic farming research open calls have some limits. One important limit is that researchers have to learn how to adapt their questions and methods to OF&F, as the research on OF&F seems to be more demanding (renewal of the methods, etc.)

Table 3a: Open Calls

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Who does issue the open call?	MI	MI	MI	DARCOF	MI	INRA ACTA	MI	-	RCN	For-mas	MI
1 or 2-step application procedure, with/without Expression of Interest (EoI)?	1	2	2	2	1	2	1+2	-	1	1	1+2
Qualification of evaluation experts?	SC RU MI	SC EX MI	SC RU MI	PE ind	SC MI EX	SC RU	Ex SC	SC	EX RU	EX1) SC	EX SC RU
Who takes final decision?	MI	MI	MI	MI	MI	DGER	MI	MI	RCN	For-mas	MI
Evaluation Criteria	See Table 3b										
Evaluation process in written form (w) or as a panel discussion (p)?	w	w	both	w	both	w	both	both	both	both	both
Duration of evaluation? (weeks)	3	3-16	24	12-20	9	40	n.d.	2-4	12-16	16-24	6-10
Can proposal be modified based on evaluation?	yes	yes	yes	yes	Yes2)	yes	yes	partly	yes3)	no	Yes

Abbreviations: **MI:** Ministry department; **PC:** Programme Committee **PE:** Permanent evaluation committee; **EX:** External peers; **ind:** independent; **SC:** Scientific experts; **RU:** Research users; **ID:** Industrial experts

1) Between 30 to 50 percent of experts are recruited from outside Sweden.

2) Only if budget is cut.

3) The PC may suggest modifications and provide funding on the basis of recommendations from the evaluators.

Scientific excellence is the only ex-ante evaluation criteria mentioned by all countries. High scores are also reached by criteria like relevance, innovation, specific competence of applicants, project management, and knowledge transfer. Table 3b shows, that no specific organic criteria are being used. This is explicitly mentioned by FI and NO. Only SE points out, that participatory research methodologies are promoted.

This analysis shows that evaluation criteria for organic research are quite close to the ones implemented in general research programmes. This may show that OF&F is on the way to get a global recognition. The fourth criteria (specific competence) is however more linked with the necessity for the researchers to know sufficiently about OF. Innovation appears to be quite

important, which means that OF is not defined once for all and has some margin of progress, which makes the research more legitimated. Innovation may also be interpreted as innovation of new food products.

Table 3b: Ex-ante evaluation criteria in ranking order

Criteria	Sum	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
SE: Scientific excellence, adequate methodology	11	X	X	X	X	X	X	X	X	X	X	X
RE: Relevance of the problem for organic farming	9	X		X	X	X	X	X		X	X	X
IN: Innovation value	9			X	X	X	X	X	X	X	X	X
CA: Specific competence of the applicants	7				X		X	X	X	X	X	X
PM: Project management	7	X		X			X	X		X	X	X
KT: Knowledge transfer of the expected results	7	X		X	X			X	X	X		X
SN: Use of scientific networks on national and international level	7	X	X		X	X		X		X		X
AS: Appropriate project size and duration	7	X	X	X	X			X	X			X
CC: Coherence with call objectives overall research strategy	5					X		X	X	X		X
CV: Clearness and verifiability of objectives and results	5			X				X	X	X		X
SO: Contribution of the project to solve the problem	4	X		X		X						X
IO: Input/Output relation	4				X		X	X				X
UR: Urgency of the problem solving	3	X	X					X				
NOC: No specific organic criteria	2					X				X		

Table 3c shows that the evaluation is carried out in eight countries anonymously, that means that the evaluation experts are not known to the applicants (AT, DE, DK, FI, FR, NL, NO and UK). The evaluation experts are usually paid somewhat above 100 Euro per proposal, with the exception of four countries (AT, CH, FR, and NL). To avoid potential conflict of interest, most countries exclude experts with personal interests or at least they have to leave the room when proposals with

potential conflict of interest are being discussed.[6] In IT and UK experts have to sign a statement, declaring the absence of their personal interests. In CH, potential conflicts are avoided by open discussion and transparency. Feedback to applicants is sent in most countries in form of a written summary of evaluators comments. DK gives feedback on all steps of the evaluation process with the possibility for comments and NO sends a copy of the reviewers form and the conclusion of the programme committee. Co-funding is only required in FI and NO. In IT permanent personnel salary represents a co-financing item by the research institution. In FI "own funding" is required, and this can also be external. However, in most other countries co-funding is encouraged and seen as a sign for the relevance of the project (CH).

Table 3c: Evaluation process

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Is the evaluation anonymous?	yes	no	yes	yes	yes	yes1)	no	yes	yes	no	yes
Are the evaluators paid?	no	no	350E day	150E Prop	15E Prop	no	yes2)	no	100E Prop 3)	yes	100E Prop 4)
How to avoid conflicts of interest?	Conf Sel Min 3 Exp	Disc Trans Comp	Excl from disc	Excl as Exp	Excl as Exp	Excl from disc Comp	Excl as Exp	-	Excl as Exp	Excl as Exp/ disc	Excl as Exp
Feed-back to applicants?	Sum	Sum	Sum	Detail	Sum	Sum	Sum	Sum	Detail	Sum	Sum
Is matching funding required?	no	no	no	no	often	no	no	no	yes	no	no

Abbreviations: **Prop:** Proposal; **Conf:** Evaluators should treat proposals confidentially; **Sel:** Avoiding conflicts when selecting experts; **Min 3Exp** Minimum 3 experts; **Disc:** Discussion; **Trans:** Transparency in the process; **Comp:** Compromises; **Excl from disc:** Involved evaluators have to leave room when proposal with potential conflict is discussed; **Excl as exp:** Involved experts are excluded as evaluators; **Sum:** Summary of the evaluation; **Detail:** Detailed feed-back

1) If experts are associated in monitoring process and/or final ex-post evaluation, anonymity is cancelled.
2) Individually according to the amount of proposals and for members of the permanent committee also in relation to the number of meetings.
3) Panel members 40 Euro per hour
4) Reviewers who are employed in the public service are not paid.

2.4 Reporting and monitoring: Based on annual and final reports

Reporting and Monitoring is very similar in all countries and consists of an annual report and a final report. Only in FI and NO reporting is semi-annual. DE and FR require a scientific colloquium. DE, FR and NO require publication of the report and other relevant publications (NO) on www.orgprints.org, and summaries on websites of the ministry/research council. Monitoring during project elaboration is taking place in all countries except NO and SE. However, the intensity ranges between more dialogue-based monitoring (AT, CH, DK, UK) to more formalised monitoring concepts with steering groups (FI, NL) and internal and external monitoring (IT).

[6] Concerning the conflicts of interest, we do not deal here with the possible divergence of opinions between the experts and the research users about the relevance of the projects. This kind of question is faced by the political decision.

Table 4: Reporting and monitoring

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Requirements for Reporting?	AR FR	AR FR	AR FR Coll online	AR FR online	AR FR	AR FR Coll online	AR FR	AR FR	AR FR PS	FR PS	AR FR
Monitoring?	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes

Abbreviations: **AR:** Annual report; **FR:** Final report; **Coll:** Scientific Colloquium; **online:** Publication of the FR on www.orgprints.org and other websites; **PS:** Popular science summary

2.5 Ex-post evaluation: Little research user involvement

Some form of ex-post evaluation is taking place in all countries except AT, CH and NO. It is not always clear whether the evaluation is carried out on a project level like in DE, or on a programme level like mid-term evaluation in DK. The criteria are very similar to those used for the ex-ante evaluation, but they are more focussed on the achieved goals and products. The evaluation is carried out by different actors: internal and external experts, steering committees, ministry staff and specialised institutions. Research users are involved in the ex-post evaluation in FI, NL, and SE. In UK scientists, experts, research users and other stakeholders are all involved in the post evaluation at the programme level.

Table 5: Ex-post Evaluation

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Ex-post Evaluation in place?	no	no1)	yes PjL	yes PrL	yes	yes	yes	yes	no1)	yes	yes
Criteria for ex-post evaluation?	-	-	Goal FR Costs Diss	Goal Costs Publ Prod Self	Self	Goal FR Publ	= ex-ante	= ex-ante	-	Publ Diss	Goals Diss
Who does the ex-post evaluation?	MI	MI	MI	DARCOF	Steer	INRA	PC Exp	PC	Exp	Exp RU	MI RP RU Exp
Are research users involved?	-	-	no	no	yes	no	no	yes		yes	yes

Abbreviations: **PjL:** Evaluation on project level; **PrL:** Evaluation on Programme level; **Goal:** Were planned project goals achieved; **FR:** Final report acceptable; **Costs:** In relation to project results; **Diss:** Dissemination of project results; **Publ:** Scientific publications; **= ex-ante:** same criteria like in ex-ante; **Prod:** other products from the project; **Self:** Self-assessment of the project leader; **MI:** Ministry department; **Steer:** Steering group; **PC:** Programme committee; **Exp:** External experts: **RP:** Research providers; **RU:** Research users

1) Research for organic farming is evaluated occasionally.

2.6 Dissemination: Similar tools in all countries

Dissemination activities are part of the contract in all countries except FR and SE. The required activities for the project can be distinguished in two groups: the first group is requested to publish the results on www.orgprints.org (DE, DK, NO). In the second group, the contractors have to choose the best suited communication tools to deliver the results to research users (CH, NL, NO, FR, IT). As further tools for dissemination, all countries mention similar ones like: conferences, workshops, different types of publications, internet and CD-ROMs. Field-demonstrations are mentioned only by CH and DE. Those tools involve often research users' organisations who may have followed up the work.

Table 6: Dissemination

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Are dissemination activities part of contract?	yes	yes	yes	yes	yes	no	yes	yes	yes	no	yes
Dissemination activities required for the project?	FR APJ	Ind3)	Int 1), 2)	Int 1)	Ind3)	-	Ind3)	Ind3)	Ind3) Int	Int4)	Ind3) Int
Tools for dissemination?	SJ APJ PM Int	Int APJ TL WS FD Conf	Int NL PJ NW Conf FD	Int NL PJ NW Conf FD	SJ APJ WS Conf CD SG	Int WS APJ NW	WS APJ SJ Conf	SJ APJ WS Conf	Int SJ APJ PM WS Conf Pat	Int	Int FR WS Conf SP APJ TL SG PM

Abbreviations: **FR:** Final report; **SJ:** Scientific journal; **APJ:** Agricultural professional journal; **PM:** Public media; **Int:** Internet, mainly www.orgprints.org; **NL:** Newsletter; **TL:** Technical leaflets; **FD:** Field demonstration; **WS:** Workshop; **NW:** Networks; **Conf:** Conferences; **CD:** CD-ROM programmes; **SG:** Steering group as a multiplicator; **PM:** Public media (including newspapers, radio, TV for consumer related topics); **Pat:** Patents

1) All results need to be published on www.orgprints.org

2) Journalistic expertise for further publication is offered by the ministry

3) Individual: Each contractor has to choose the suited communication tool to deliver the results to research users

4) Centre for sustainable agriculture (CUL) is responsible for communication with research users.

2.7 Gaps: How procedures should be improved

The open question on how procedures should be improved provides a few aspects which are summarized in table 7. AT and IT[7] wish more external experts for evaluation. DK and DE find the evaluation process very time consuming, whereas FR wants to optimise the priority setting process and FI the dissemination activities. For CH the challenge is to have a transparent process and to keep administration load to a minimum at the same time.

[7] Especially for those projects particularly oriented to a transnational approach.

Table 7: Gaps: How procedure should be improved

Country/ Summary of remarks	Remarks on improvement on own procedure
AT More external experts for evaluation	▪ Rely to a greater extent on external experts for proposal evaluation ▪ Make full use of the internet based tools for research procurement ▪ Intensify discussions on possibilities and options for improvements in programme development
CH Stay flexible, keep administration to a minimum	▪ It is important to have transparent and well-structured processes. But there must be possibilities to act fast and flexibly when new tasks or project proposals are coming up. –This is a continuing optimisation process. ▪ FOAG's funding is mainly an institutional funding. Additional research resources are small. This approach leads to a system with a minimum of administration. The goal must be to use the resources for research.
DE Simplify workflow and administrative issues	▪ Splitting of responsibilities between the case decision in the profession at the Office of the FOFS and the compliance at the BMVEL at different levels of the evaluation process is taking a lot of time. ▪ Workflow could be improved by having a timely unlimited program to prevent the work pressure appearing in "waves". Administrative issues could be simplified.
DK Very time consuming	▪ The major problem is that it is very time consuming
FI Improve dissemination	▪ Dissemination of results should be even better. Evaluation process should include special 'organic' evaluation, too.
FR Improve priority setting Organic ideology versus pragmatic approach Improve information to research teams Programme should be longer and projects better financed	▪ the priorities set up by the professional organisations should be the outcome of a more general procedure stating the organic farming's development strategy. On this way, the research agenda could be built up on a more clear basis (goals, pathways to go, etc.) ▪ the priorities must reflect a wider range of expectations from different research users. The farmers organisations' views must be completed with the ones from the consumers, the processors, the environmental movements, etc.. ▪ the different generic calls of offer (ADAR, Ministry of research) not exclusively devoted to OF should be encouraged to put the organic theme as a priority ▪ the projects are more and more of systemic kind. This can be improved even more. ▪ The projects are often managed in partnership, but the partners have not enough means to really follow up the project. A significant financial incentive bonus could be paid. ▪ The interest of the teams for organic farming must be enhanced, through a better information ▪ The research program should be longer than 3years, as this duration doesn't allow for long term investment. ▪ Ideally, a research centre (from the DARCOF model), able to coordinate the institutions' programs on OF, is necessary at the national level ▪ Many priorisation problems come from a lack of development strategy in the Organic sector. Two examples are given on divergence of views are given: protein quantity *versus* protein quality for bred making and fertilisation in OF with focus on crop rotation vs monitoring mineral element dynamics. As those two thesis are in conflicts, often on ideological basis, the research system is "in between" and has some difficulties to run and take part in the debate.
FR	▪ More generally, the "organic ideology" doesn't make easier the implementation of a sound and pragmatic way to go.

Country/ Summary of remarks	Remarks on improvement on own procedure
IT More external experts	▪ Evaluation and monitoring could be carried out also including experts from different countries in the panel, especially for those projects particularly oriented to a transnational approach, even if carried out at national level.
NL Improvement is continuous process	▪ We are continuously refining and revising our procedures in the light of changes in our needs and in the light of circumstances in the research community.
NO To early for conclusions	▪ We have lately introduced some new procedures and we need to experience how they work in practice before we know how they may be improved.
SE	▪ -
UK Improvement is continuous process	▪ We are continuously refining and revising our procedures in the light of changes in our needs and in the light of circumstances in the research community. In general, Defra experience supports the great value of the programme owner (i.e. Defra) maintaining an in-house intelligent customer function in research procurement and funding. This is key to the development and delivery of effective research investments, and healthy interaction with the science base. This involves using internal science teams that are independent of policy to understand the research needs (policy and external needs) and convert these into effective researchable questions, considering the wider science base.

2.8 Specific questions: Important differences between countries

In all countries all or most of the projects are embedded in an organic context.

In DK and FI most of the projects take place in a practical or commercial context, which includes on-farm-research and research in real organic food chains, with active research user involvement. AT, CH, DE and FR consider half of their projects to be in a practical or commercial context. Four countries (IT, NL, NO, SE) see only some of their projects in a practical or commercial context, but in NO the user involvement will increase significantly in coming years. UK procures its own projects that respond to policy needs and are not just commercially driven. UK also uses a grant scheme (LINK) designed to bring academia and industry together and thus funds commercially driven research through this.

The answers and comments regarding the percentage of inter- and multi-disciplinarity show important differences in numbers and understanding.[8] Whereas SE considers only 10% of their projects to be interdisciplinary, AT, NL and UK consider 100% of their projects to be interdisciplinary. NL and UK both find that all agricultural R&D is multi-disciplinary by its very nature. CH and IT underline that interdisciplinarity is not a goal "per se". Scientists have to engage those disciplines that are required to answer the actual research questions in the best way. However, several countries have proposals how to stimulate interdisciplinarity: By encouraging participation of social scientists and economists (AT, FI), by continuous confrontation of scientists with needs of research users (DE) and debates on research methodologies (DK) and also by bringing conventional and organic researchers together (FI, CH). See also comments 1-8 in Table 8.

[8] **Interdisciplinarity** is defined as a type of academic collaboration in which specialists drawn from two or more academic disciplines work together in pursuit of common goals. There are varying degrees of interdisciplinarity. In **multidisciplinary projects**, researchers from two or more disciplines work together on a common problem, but without altering their disciplinary approaches or developing a common conceptual framework. True interdisciplinarity occurs when researchers from two or more disciplines pool their approaches and modify them so that they are better suited to the problem at hand.

The majority sees its research mainly driven by researchers (DE, FI, DE, IT, NO, SE) whereas AT and DK answer with fifty-fifty. CH, NL and UK see their research mainly as research user driven. UK comments that this question is irrelevant, because its research is driven by Defra and the users' needs (including scientists) and the resulting research questions.

None of the countries have criteria to make "grass root research" and "scientifically controversial topics" eligible. But in most countries they are eligible, if methodologically sound. AT says that they could be funded with a lot of reservations. UK finds this question irrelevant because all their research uses scientific methods and all researchers are observers.[9] Participatory R&D is used where appropriate.

In DK "Grass root research" is funded in another programme, which should be initiated and headed by farmers. FR points out, that grass root experiences are sometimes useful to form the correct hypothesis. FR also uses a specific design to deal with scientifically controversial methods called "the Herody method".

[9] Defra's research programme covers all its needs, which includes research needs identified by end users (grass-roots research), including participatory R&D, and also scientifically controversial research where needed.

Table 8: Specific questions

Question	AT	CH	DE	DK	FI	FR	IT	NL	NO	SE	UK
Are the projects embedded in an organic context?	All	Most	All	All	Most	All	Most	Most	Most	Half	All
Do projects take place in a practical context?	Half	Half	Half	Most	Most	Half	Some	Some	Some	Some	Some
What's the percentage of inter- and multidisciplinary projects?	100	60	?	80	40	50	90	100	?	10	100
How do you stimulate interdisciplinary?	1)	2)	3)	4)	5)	-	6)	7)	-	8)	7)
Are the driving forces behind the projects research providers **(RP)** or by research users **(RU)**?	50:50	Mainl RU	Mainl RP	50:50	Mainl RP	Mainl RP	RP	RU	Mainl RP	RP	RP RU
Do you have criteria which make "grass root research" eligible?	no	no 8)	no 8)	no9)	no	no10)	no8)	no	no	no	no11)
Do you have criteria which make scientifically controversial topics eligible?	no	no 12)	no 12)	no 12)	no	no 13)	no	no	no 12)	no 12)	yes

1) The ministry encourages participation of social scientists and economists.
2) Interdisciplinary is not a goal "per se". Scientists have to engage those disciplines in order to answer the research question in the best way.
3) Confrontation of scientists with the needs of extension service, farmers, political partners and other research users in seminars, workshops, conferences,
4) Through debates on research methodology and what is O F & F
5) Bringing together organic and conventional researchers, underpin networking of researchers in biological and social sciences
6) Not specific, it is a pre-requirement for project proposals
7) Irrelevant question, all agricultural R&D is multi-disciplinary
8) No criteria, but "grass root research" is eligible if methodologically sound
9) "Grass root research" is funded in an other programme, which should be initiated and headed by farmer
10) Grass root experiences are sometimes useful to form the correct hypothesis
11) Irrelevant question – the research is driven by the users' need/problem and resulting research question. All our research uses the scientific method and all researchers are observers. Participatory R&D is used where appropriate.
12) No criteria, but eligible if methodologically sound
13) Specific design for such questions called "Herody method"

3 Summary and conclusions

- Four countries have their organic farming research integrated in a general scheme and have no **specific organic programme**. Specific calls are issued just occasionally. Another important difference between the countries is the **frequency of the calls**. Five partners issue their calls not regularly. The Scandinavian countries and France launch calls regularly. However the frequency varies between once every five years (DK) up to four times a year (NO).
- The description of the **priority setting process** and of the actors involved is very similar in the participating countries. There might be a difference in the level of formality. Some countries describe the process as rather informal, others use a more formal approach (two-steps-consultation).
- At the first sight, there seems to be no big difference on how the countries handle the **organisation of open calls**. With some exceptions, most countries know the possibility to submit a pre-proposal and the evaluation process includes also a panel discussion. However there is an important difference about the duration of the evaluation, which lasts between 3 and 40 weeks. This indicates that there might be more differences in the organisation of the open calls, than it appears from this survey. This shows that research on OF&F currently is becoming a field where the rules are close to the general ones. This contributes to legitimate the research on OF&F.
- The most frequently named **criteria** is scientific excellence. Furthermore specific competence of the applicants as well as relevance and innovation for organic farming are important criteria for the ex-ante evaluation. None of the partners uses specific criteria for organic farming or suggests criteria that could be used. Also nobody expresses the need to enlarge the set of criteria specifically suited to evaluate organic farming projects.
- The countries deal differently with anonymity and payment of the **evaluators**. Potential conflicts are avoided in different manner ranging from open discussion to the exclusion of experts. Matching funding is requested by some partners and is regarded by most partners as positive.
- The requirements of **reporting and monitoring** are similar in all countries.
- The **ex-post evaluation** follows basically the same criteria as the ex-ante evaluation.
- **Dissemination activities** are part of the contract in nearly all countries. Publishing in Organic Eprints is compulsory for some countries, whereas others leave it to their researchers to choose adequate dissemination tools.
- Participants make only a few suggestions on how to **improve the procedure**: simplify workflow, to minimise administration load and to have more external experts are the most important aspects. Developing specific criteria for the evaluation process are not mentioned. UK suggests to reinforce the internal expertise of the programme owner, i.e. to develop an internal intelligent customer function.
- The opinion on whether and how to **stimulate inter-disciplinarity** is controversial. Some participants see all agricultural research as multi-disciplinary, whereas others stimulate it through methodological debates and encourage the inclusion of social scientists. None of the countries uses explicitly criteria which makes grass-root research and scientifically controversial methods eligible. However, nearly all say that such research may be accepted if methodologically sound.

ERA-NET

The objective of the ERA-NET scheme, in the context of the European Research Area (ERA), is to step up the cooperation and coordination of research activities (i.e. programmes) carried out at national or regional level in the Member States and Associated States. This target shall be realised through the networking of research activities, including their 'mutual opening' and the development and implementation of joint activities.

CORE Organic

The overall objective of CORE Organic is to enhance quality, relevance and utilisation of resources in European research in organic food and farming and to establish a joint pool of at least 3 million € per year for transnational research in organic food and farming by the end of the project in 2007.

By gathering a critical mass and establishing a coordination function the specific objectives are:

- Increased exchange of information and establishment of a common open web based database
- Coordination of existing research and integration of knowledge
- Sharing and developing best practice for evaluating organic research
- Identification and coordination of future research topics

Partners in CORE Organic

Austria	Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
Denmark	Danish Directorate for Food, Fisheries and Agri Business (DFFAB) & Danish Research Centre for Organic Farming (DARCOF)
Finland	Ministry of Agriculture and Forestry (MMM)
France	Ministry of Agriculture (MAAPAR) & National Institute for Agricultural Research (INRA)
Germany	Federal Ministry for Food, Agriculture and Consumer Protection (BMELV) & Federal Agency for Agriculture and Food (BLE)
Italy	Ministry of Agriculture and Forestry (MiPAF)
Norway	The Research Council of Norway (RCN)
Sweden	Swedish Research Council for Environment, Agricultural Science and Spatial Planning (Formas)
Switzerland	Swiss Federal Office for Agriculture (FOAG)
The Netherlands	Ministry of Agriculture, Nature and Food Quality (MinLNV)
United Kingdom	Department for Environment, Food and Rural Affairs (Defra)

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