

# Stimulating the potential for innovation in organic farming by research

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## 1. Introduction and history of organic farming research

Organic farming research has been developed over 4 stages: i) Pioneer farmers and scientists, ii) pioneer private research institutes, iii) organic farming chairs at universities and finally iv) organic farming projects and institutes at state research institutions (figure 1). Today, organic agriculture has become finally accepted within agriculture and food research. Some of the key players in organic research in Europe are mentioned in *table 1*. Mainly in Europe, public funded research has shifted towards organic farming, whereas the research resources for conventional farming have been cut down considerably

Figure 1: Development of organic farming research in a historical context.

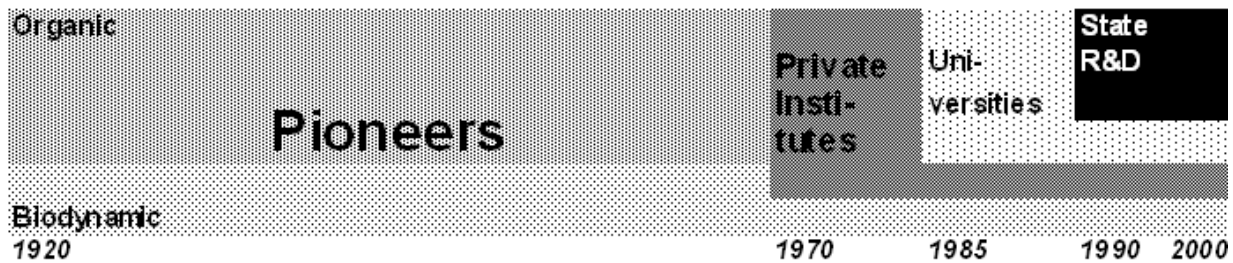


Table 1: Key players in organic farming research

<p><b>The Pioneers</b></p>	<p><b>Philosophical extension of research:</b></p> <p>Rudolf Steiner, Ehrenfried Pfeiffer, Lili Kollisko</p> <p><b>Criticism of science:</b></p> <p>(Samuel Hanemann), Eve Balfour, Hans-Peter Rusch</p> <p><b>Agro-ecological approach:</b></p> <p>Raoul Francé, Albert Howard, Franz Sekera, Eduard von Boguslawski, Jean Boucher</p>
<p><b>The private research institutes</b></p>	<p>Research Institute of Biodynamic Agriculture, D (1954)</p>

	<p>Research Institute of Organic Agriculture (FiBL), CH <b>(1974)</b></p> <p>Louis Bolk Institute, NL <b>(1976)</b></p> <p>Rodale Institute, USA (1947, research activities since <b>1976</b>) <b>(USA)</b></p> <p>Ludwig Boltzmann Institute for Organic Agriculture and Applied Ecology, A <b>(1980)</b></p> <p>Elm Farm Research Centre, UK <b>(1982)</b></p> <p>Henry Doubleday Research Association (HDRA), UK <b>(1984)</b></p> <p>Norwegian Research Institute for Organic Agriculture (NORSOK) <b>(1987)</b>.</p>
<p><b>Organic Chairs at universities and agricultural colleges</b></p>	<p><b>Germany</b> : Kassel-Witzenhausen, Bonn, Gießen, Nürtingen, Osnabrück, Hohenheim; coordinators of at the universities of Munich and Stuttgart</p> <p><b>Austria</b>: University of Vienna</p> <p><b>Denmark</b>: KVL, University of Copenhagen</p> <p><b>Netherlands</b>: University of Wageningen</p> <p><b>Sweden</b>: Swedish Agricultural University</p> <p><b>UK</b>: Institute of Rural Studies, The University of Wales Aberystwyth, Scottish Agricultural College (SAC)</p> <p><b>Hungary</b>: Universities of Budapest and Gödöllő</p> <p><b>Poland</b>: University of Warsaw</p>
<p><b>State R&amp;D</b></p>	<p><b>Denmark</b>: Danish Research Centre for Organic Farming, <i>DARCOF</i>, Foulum</p> <p><b>Finland</b>: Research Station for Ecological Agriculture, Partala</p> <p><b>Sweden</b>: Centre for Sustainable Agriculture, <i>CUL</i>, Uppsala</p> <p><b>Norwegian</b> Centre for Ecological Agriculture, <i>NORSOK</i>, Tingvoll Gard</p> <p><b>UK</b>: Ministry of Agriculture and Fishery (MAFF), 54 projects at universities, colleges and state or recently privatised institutes</p> <p><b>NL</b>: Research projects carried out by conventional research institutes.</p> <p><b>Austria</b>: State research institutes at Gumpenstein and Linz</p> <p><b>France</b>: Institut National de Recherche Agronomique, <i>INRA</i></p> <p><b>Swiss</b> Federal Research Station for Agroecology and Agriculture, <i>FAL</i>, Zürich</p>

**Germany:** Bundesforschungsanstalt für Landwirtschaft, *FAL*, Trenthorst; numerous research project as regional state research stations

## 2. Further stimulation by research is crucial

Several recent review papers have dealt with the needs and priorities of research activities in organic farming (Niggli and Willer 2000, Padel 1999, Willer and Zerger 1999, Wynen 1998, Hoeeok 1997, Niggli and Lockeretz 1996). Because agricultural research has neglected organic farming for decades, presentations of research needs turn out to be long lists of top priority.

Organic farmers face the same problems as conventional ones do. 'Unfortunately', however, organic farming takes a more integrative – and therefore more time consuming – approach to resolving them. Considerably less private-sector research support, such as from pesticide and seed companies, is allocated to organic farming. Therefore, research has the potential to be the crucial factor driving organic farming quickly and substantially forward. It is pure nonsense to discuss the productivity and economic and ecological performance of organic farming before stimulating its potential by strengthening and reassessing national and EU research activities.

To judge research priorities properly, the following questions have to be considered (see also *table 2*):

1. What impedes the fast growth of organic conversion – locally, regionally and globally – most? Focus: Production techniques, economic optimisation strategies.
2. What could endanger the market success of organic food? Focus: Quality, food safety.
3. What is needed for the long-term and sustainable progress of organic farming? Focus: Ethics, animal welfare, genetic resources, landscape and biodiversity, social issues.

*Table 2: How to judge research priorities?*

Criteria, goals	Fields where activities are need (1= highest priority)
<b>Fast growth to 20 or more percent of land area.</b>	<ol style="list-style-type: none"> <li>1. Arable crops (reducing labour costs! weeding! plant protection! productivity!)</li> <li>2. Horticultural crops (plant protection! varieties! labour costs! quality and marketing!)</li> <li>3. Non-ruminants (nutrient cycles! protein supply! appropriate housing! breeding! free range systems!)</li> <li>4. Ruminants (tethering! utter diseases! endoparasites! breeding!)</li> <li>5. Grassland</li> <li>6. Economic Aspects</li> <li>7. Policy advice (optimal support instruments for organic agriculture; research into ecological, economic, social advantages of organic farming and optimisation strategies)</li> </ol>
<b>Ensuring market success (food scares, good image, quality)</b>	<ol style="list-style-type: none"> <li>1. Ruminants (BSE! Antibiotics! milk quality! Tethering!)</li> <li>2. Horticultural crops (plant protection! copper! High external input instead of closed cycles! N-management! Sensorial and cosmetic quality)</li> <li>3. Labour situation/fair trade issues (casual labourers from the South and the East!)</li> <li>4. Non-ruminants (nutrient cycles not closed! Protein feed supply!)</li> </ol>

	<p>inappropriate housing! Intensive use of chemical remedies!)</p> <ol style="list-style-type: none"> <li>5. Arable crops (nitrates! mycotoxins! missing crop rotation! Soil compaction-&gt; soil erosion!).</li> <li>6. Nature conservation (no minimal requirements in the standards).</li> <li>7. Grassland (too intensive use, no biodiversity)</li> <li>8. Processing (diversification of product range, sensorial quality; GMO)</li> </ol>
<p><b>Long-term and sustainable progress of organic farming.</b></p>	<ol style="list-style-type: none"> <li>1. Ruminants: Ethical questions, breeding, holistic approach to animal health.</li> <li>2. Non-ruminants (nutrient cycles! Breeding! Consequent free range and fattening systems).</li> <li>3. Nature conservation: Organic farms must become partners of nature conservation.</li> <li>4. Rural development: Potential of organic farming for rural regions, landscape maintenance and development, jobs, decentralised economic growth, social work of farmers.</li> <li>5. Organic produce in Supermarkets (fair trade! convenience!)</li> <li>6. Plant production (breeding, optimisation of ecological plant protection and fertilisation systems)</li> <li>7. Energy (use of on-farm-generated/renewable energies, reduction of energy consumption, optimisation of packaging, transport, life cycle assessment)</li> <li>8. Processing (ingredients, energy)</li> <li>9. Soil management (soil life, appropriate (use of) machinery)</li> <li>10. Progress in fields related to organic farming, textiles, forest, aquaculture, ecological production of farm and processing inputs</li> </ol>

### 3. Sticking to the inherent methodological approach of organic farming research

Further progress in organic farming cannot be obtained by improving or changing 'vertically' single parts of the landscape, the farm or the individual production technique without regard to the horizontal interactions and the fragility of agro-ecological systems. Therefore, organising organic farming research within the currently completely segregated agricultural research structures is not appropriate – indeed, such an approach may even be lethal to organic farming. The prerequisite to strengthening research in this field is to have strong and efficient core structures or schemes (national or regional hubs) which support specialists in complex research programmes. These hubs can be organised as a leading institution, as a permanent forum of researchers or as a strongly facilitating secretariat (see table 4).

Table 4: Different ways of organising organic farming research by appropriate structures (hubs)

Danish Research Centre for Organic Farming (DARCOF), Denmark	Research institute "without walls", research secretariat which co-ordinates projects carried out at conventional research institutes (universities, state centres, private institutes) financed by a R&D programme of the ministry.
Louis Bolk Institute, Netherlands	Researchers of the private pioneer institute Louis Bolk are involved as external experts in all organic farming research projects of conventional institutes in Holland. Some of the projects are carried out directly at Louis Bolk Institute.
Research Institute of Organic Agriculture (FiBL), Switzerland	Most of the research in organic farming in Switzerland is done at the private pioneer institute

	FiBL. Research projects cover all disciplines. Projects are often multidisciplinary. Extension (advisory work) is under the same roof as research.
Colloquium of Organic Researchers (COR), United Kingdom	A loose platform of committed organic farming researchers from private institutes, universities and state R&D dedicated to discuss methodological issues, to co-ordinate priority setting and to induce concerted projects.
Research initiative organic farming (FiÖL), Germany	A project of 5 leading research institutes with a common professional secretariat co-ordinating a permanent platform as it is described for COR (see above). Project in application.

Methodologically, organic farming research distinguishes itself from conventional research by:

1. Applying consistently multidisciplinary approaches to solutions.
2. Integrating stakeholders (farmers, consumers, nature conservationists, processors) into research (participatory approach).
3. Re-scaling continually the focus of research work in the same project (e.g. cell, plant, field, farm, region, market, policy).
4. Considering and deciding on long term impacts (economy, ecology, health and social welfare).
5. Considering individual, social, ethical and philosophical frameworks of agriculture and food in addition to natural science.

Because of these methodological differences, organic farming research proposals often do not match the criteria of research funds. This partly explains the high percentage of failed organic proposals. Without a major change of evaluation procedures, organic farming research will become 'conventional' step by step. To avoid competition between organic farming research and fundamental research in molecular-biology, separate programmes for organic farming research need to be set up. Such programmes ensure a level playing field for fair competition, namely between organic farming projects.

### 3. Recommendations and conclusions

1. On national as well as on EU-level, research funds should be directed substantially towards organic farming in order to improve the economic and ecological performance of organic farming. The impact of research funds is very high in this field of food production, because the potential of organic farming is only slightly exploited by research.
2. Integrating organic farming research into conventional research structures means disintegrating organic farming itself. Therefore, special attention should be given to how research activities are organised. National or regional centres of competence (hubs) are needed in order to provide and to maintain an appropriate quality of research. These hubs can be organised as real or virtual centres.
3. Evaluation procedures for most national and EU research funds do not consider adequately the unique approach and methodology of organic farming research. These procedures have to be amended and evaluators have to be trained. A separate programme for organic farming R&D within the future EU frameworks is strongly recommended.

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