From Organic to Agro-Ecosystem Research – a Challenge

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Facts & figures

1st scientific research institute in organic farming (1973).

150 staff in Switzerland.
30 staff in Germany.
20 staff in Austria.
60 to 80 students/interns.

300 running projects in Switzerland and in developing and emerging countries. 50 projects in Germany and Austria.

Budget: 22 million US$ in CH, 3 million in D and 1.5 million in A.

Total organic research in Switzerland: approx. 40 million p.a.
My talk is about …

- Organic and agro-ecology.
- Dilemmas of organic agriculture.
- Challenges for organic agriculture.
- Research questions.
Agro-ecology is …

- Historically: Application of ecology to agricultural systems (Altieri, 1995).

- 3 forms of agro-ecology:
  - A scientific discipline;
  - An agricultural practice;
  - A social movement.

- A new buzzword adopted by actors who promote conventional agriculture?

Syngenta promotes «bee pastures»
Agro-ecological research

- Develops more autonomous, participatory ways of producing knowledge that is ecologically literate, socially just and relevant in the context and dynamic complexity.

- More responsibility and decision making power to farmers and citizens.

- More significant roles of non-researchers (farmers, food workers, citizens-consumers) in the production and validation of agro-ecological knowledge.

Levidow et al., 2014
Agro-ecological farm practices

➤ Less dependence on monoculture systems, input-substitution, external input markets and costly biotechnology packages.

➤ Integrated agro-ecosystems (based on functional biodiversity and on eco-functional intensification).

➤ Resource availability from local agro-ecosystems (recycling, “virtuous circles”).

➤ Protect environment and produce public goods.

➤ Local or regional market structures (circular economy models).

➤ Territorial development strategies (also food sovereignty).

➤ Interventions by social movements.

Levidow et al., 2014
## Farming methods and standards

<table>
<thead>
<tr>
<th>Agro-ecological farming</th>
<th>Organic farming</th>
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<tbody>
<tr>
<td>Many excellent principles and recommendations, vaguely worded.</td>
<td>4 principles of health, ecology, fairness and care, more bindingly worded.</td>
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<tr>
<td>No mandatory standards.</td>
<td>Mandatory standards.</td>
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<td>No bans and detailed restrictions.</td>
<td>Bans and detailed restrictions.</td>
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<td>Basically open to all technologies.</td>
<td>General technology bans.</td>
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<tr>
<td>No inspection.</td>
<td>Inspection and certification (3rd party, group certification, PGS).</td>
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<tr>
<td>Social learning process.</td>
<td>Jump in, accept it or forget it</td>
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Different approaches to sustainability

- Improved technologies like minimum/ no tillage or GMO crops.
- Integrated Production (IP, IPM).
- Low Input Agriculture (LIA) or Precision Farming.
- Low External Input Sustainable Agriculture (LEISA).
- Organic Farming.
- Organic Farming & reduced tillage.
- Organic (successional) agroforestry systems.

Ecological or eco-functional intensification
A protective space* (niche) for innovations or a method to become mainstreamed?

*Within this protective space, niche actors can nurture the path-breaking innovation so it becomes more robust through performance improvements and expansions in supportive sociotechnical networks* (Smith & Raven, 2012)

Willer et al., 2014
Organic farming – one-fits-all solution?
Organic farming is very heterogeneous

- Subsistence farmers, pastoralists, agrosylvicultural farmers
- Intensive small holder farmers with mixed farms
- Family farms with specialisation
- Big farms enterprises

www.fibl.org
Organic farming is very heterogeneous

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Completely different markets and qualities
Organic farming is very heterogeneous

- Subsistence farmers,
- Pastoralists,
- Agrosylvicultural farmers

- Intensive small holder farmers with mixed farms

- Family farms with specialisation

- Big farm enterprises

Completely different research needs and knowledge creation
„We would if we could“: obstacles (Swiss case)

➢ Strong support of organic farmers with the highest subsidies in the world (ecological direct payment scheme).
➢ Permanent and daily promotion of organic foods in Supermarkets.
➢ All food available and immediately accessible in organic quality. Permanent choice.
➢ High annual growth rates.
➢ Excellent organization of organic farmers in one umbrella association with 2 labels «Bio Suisse» and «Demeter».
➢ 7,000 US$ spending p.a. on research and advise on each organic farmer.
➢ Positive appreciation by policy makers, the scientific community and media.
Are the results formidable or modest?

- 12 percent organic farmers in Switzerland. Stagnating for 10 years.
- 7 % of all food sold is organic.
Main factors limiting yields in organic farming

Ratio organic/conventional in the Seufert study: 0.75

*Best Practice: mainly good disease, pest and weed control, adapted crop rotations and varieties.

Seufert, et al., 2012: Nature 485,
Yields are an issue and especially yield stability
Nitrogen supply – especially in vegetable crops and on stockless farms
The self-regulated apple orchard at FiBL

All system-oriented techniques applied (results from 30 years of apple research). No sprays!

Only failure after 10 years: apple scab (Venturia inaequalis)
Research strategy of FiBL: Always apply the entire innovation pathway starting with system redesign

- Approved insecticides of biological and mineral origin, mating disruption, physical control
- Inundative and inoculative release of biological control agents
- Habitat management fostering functional diversity
- Breeding and testing of appropriate varieties
Innovation pathway

Permanent system improvement and co-innovation between farmers, food processors, traders, researchers, farm advisors and civil society:

- Recover traditional or empirical knowledge, test and improve it and make it available.
- Facilitate joint innovation of actors (co-innovation).
- Improve existing organic farm technique.
- Improve resilience of production systems, farms, food chains and landscapes.

Science driven disciplinary and multi-disciplinary progress:

- Accelerate the development of inputs, techniques and technologies suitable for organic and agro-ecological systems.
- Recommend amendments for standards for organic and sustainable production systems.

Sustainability Assessment in line with SOAAN criteria, indicators and metrics

Regionally adequate adaptations of innovation by organic farmers and actors
Livestock

- Breeding of livestock for low-input environments.
- Biocontrol and botanicals for veterinary medicine.
- Animal welfare and feeding issues.
Health management of livestock

Endo-parasites

Pasture management

Genetic resistance and breeding programs

Bio-control
(Duddingtonia flagrans)

Botanicals
Organic and conventional agriculture: Research funding not comparable!

Global research spending in US $ (2000)

Addressing specifically organic problems: less than 1 per cent.
Organic agriculture: a global vision and research strategy
Vision

Pathway 1: Empowerment of rural areas

Pathway 2: Eco-functional intensification

Pathway 3: Food for health and well-being

Decisions based on the principles of health, ecology, fairness and care

Secure food and safeguard ecosystems