

Challenges and opportunities for organic research and extension

Organic farming holds the great promise to solve some of the environmental and social problems caused by conventional agriculture. To play this role at the global level, farmers need access to essential knowledge on efficient ways, sustainable means and support structures that encourage organic practices and incentives to adopt them.

Public and private support for organic farming research, extension and education lag far behind the funding, infrastructure and staff involved in conventional and biotech agriculture. While most organic agricultural research is carried out in temperate climates, the need to conduct organic agriculture research is arguably greater in the tropics, with their more dynamic and fragile ecosystems.

This research should be targeted to organic farms and their concrete challenges and not to satisfy research interest alone. Farmer education facilities are almost nonexistent and in Africa, many agricultural universities are in severe financial needs and have

very limited resources available for state-of-the-art organic research and teaching.

To be sustainable, an agricultural system must be productive and profitable over a long time. To test such properties, the research design must take into account meaningful criteria that help measure and monitor a system's stability, resilience and productivity across a large area over many years. This requires a research design that is compatible with an ecological approach that factors in biodiversity and ecosystem services. All of these aspects make organic farming research a greater challenge than conventional research.

■ Where is research most urgently needed?

Among the top research priorities identified over the years by organic farmers and practitioners are weed management, plant breeding leading to locally adapted and higher yielding



seed, soil fertility restoration, biological control, practical biodiversity, and marketing and policy incentives.

Weed management. Organic farmers depend on a combination of cultural, physical and biological practices to reduce yield losses from weed pressure. No-till annual cropping systems avoiding herbicides hold great promises for carbon sequestration and soil conservation, but will take years to optimise. Cover crops offer a low-cost and ecology-based method to suppress weeds when their variety selection and timing can be optimised.

Plant breeding for low-input and organic farming conditions. Varieties that are responsive to nutrients slowly released from organic matter by biological activity are needed to decrease the need for chemical inputs and increase the efficiency of nutrient cycling. Participatory breeding programmes are rapidly emerging to meet farmers' needs, but such efforts require research support.

Gian L. Nicolay

Brian Baker

*Research Institute of
Organic Agriculture – FiBL
Frick, Switzerland
gian.nicolay@fibl.org
brian.baker@fibl.org*



Photo: G. Nicolay

Research has to contribute towards agricultural systems that are compatible with food sovereignty and community access to food.

ing and optimising the efficient rearing, delivery and release of beneficial organisms. Optimal value addition and minimisation of crop losses after harvest is a high priority to increase the food supply and enhance profitability of organic produce.

Marketing and policy research.

Farmers need market information to take optimal decisions with regard to the crops to be grown, how, and for what market. A good understanding of consumer preferences and value chain and food web functioning is essential to help both farmers and other actors to optimise their collaboration to fulfil expectations, especially among quality-conscious consumers. Social science research has to go beyond market studies. Since consumers do not pay for all the environmental services and other benefits of organic agriculture, studies should also help to develop recommendations on how to best promote organic food for consumers and policy-makers to help farmers recover the full value of the different benefits organic farming creates. And food systems need to be compatible with food sovereignty and community access to food.

■ **Processes to reinforce**

Farmer education. As a farmer-centred and grassroots movement, organic agriculture has largely relied on farmer-to-farmer networks and exchanges to disseminate information. Research has to support the linking of the farmers with the other stakeholders in the food supply chain, specifically markets for organic food in developing countries. At the same time, farmer knowledge needs to be valued as a source of experience and a

base for innovation. This can be accelerated by investing in farmer education, which will also empower the rural communities.

Networking. Organic agriculture research is still at a formative stage, and needs to build related human capacities. Farmer innovators and farmer organisations grouped around value chains have to build networks to commonly solve their many problems and address their specific research needs to the scientists.

Knowledge dissemination. Organic farming research stands to benefit all farmers and consumers. Organic food should not be limited to affluent consumers in wealthy countries – as we believe that access to healthy food is a fundamental human right. Organic farmers have pioneered a number of sustainable technologies, allowing researchers to fine-tune solutions that can in turn be adopted by non-organic farmers, as was the case for the use of pheromones and the introduction of beneficial fungi as antagonists to soil-borne pathogens.

Commitment. Increased funding for research in organic farming production processes is urgently needed to develop sustainable food systems. For example, research is needed to establish the impacts of residues in food on human and animal health as well as for the definition of a public health policy actively supporting a more sustainable consumption. However, more money is not enough. Political will, civil society commitment and public determination are required to overcome the challenges posed by the changes to move towards sustainability.

International collaboration. There is an urgent need to develop strong leadership and social networks to serve as a foundation for the expanded capacity all around the world, to overcome the current limited and localised impact of sustainable agriculture. The

Soil fertility restoration. Soil scientists have long been aware that the soil has to be based on soil organic matter and a healthy population of soil organisms in order to cycle nutrients efficiently. More beneficial species are being identified and scientists are making progress in understanding their roles in nutrient cycling, disease suppression and crop health. These ecological webs are often site-specific, depending on soil type, crop, climate and other factors. Science has still a long way to go to fully understand and address the critical issues of desertification and declining soil fertility.

Biological pest and disease control. Classical biological control – the introduction and augmentation of populations of beneficial organisms – has still not caught up with the amount of research that has gone into chemical control. Locally based farmer-researcher associations should test and improve innovations based on biocontrol agents and adapted cultural practices. Farmer associations also have a history of work in pioneer-

FiBL's research activities

FiBL has been running long-term trials in Switzerland that compare organic, biodynamic and conventional farming systems since 1978. FiBL began the trials in 2005 with tropical systems in Kenya, India and Bolivia, financed by SDC (Swiss Agency for Development and Cooperation), LED (Liechtensteinischer Entwicklungsdienst), the supermarket chain coop and Biovision foundation. While results in these tropical trials are preliminary, the experimental design will permit researchers to gather data and test hypotheses related to sustainability and productivity.

A case study from West Africa

"Syprobio" is a recent EuropeAid financed research and development project in West Africa aiming to promote farmer innovations – both technical and social – compatible with organic standards. With 15,000 organic farmers as partners in Mali, Burkina Faso and Benin, FiBL-led researchers developed a network to conduct on-farm research testing local innovations. The primary cash crop is organic cotton, but farmers in the network also produce and market specialty crops as well as grains grown primarily for home consumption. The 100 elected farmers, representing 2–3,000 organic farmers are conducting on-farm research and cooperating with 40–50 researchers and technicians in testing 30 innovative practices. Soil fertility, seed improvement, pest management, agronomy and socio-economics are the main themes. The innovations to be tested shall improve food security and climate change adaptation. Comparative research is done in order to better understand the economic and agronomic differences of organic, conventional and GMO systems in the sub-region.

Farmer participation in research and technology development ensures realistic and practical systems.

Photo: G. Nicolay



International Federation of Organic Agriculture Movements (IFOAM) and the Research Institute of Organic Agriculture (FiBL) announced at Rio+20 the formation of the IFOAM Global Organic Research Network (IGORN), which will foster international collaboration in organic agriculture research, exchange of information between researchers in organic agriculture, and the dissemination and application of organic research results.

Communicate that organic works.

Farmers in emerging and developing countries have developed and improved sustainable techniques that have for centuries proven to be stable, resilient and productive. These systems have been challenged in recent years by urbanisation, concentration of land-

ownership, and capital-intensive technologies. Relatively few farmers with access to land, infrastructure, credit and technology have benefitted and put many smaller, undercapitalised farmers under pressure or off their land, which tends to increasingly polarise rural communities. It remains to be seen whether organic farming can co-exist with genetic engineering, broad-spectrum pesticides and other practices used by conventional farmers.

■ Call for a paradigm shift

Reductionist methodologies are still the mainstream basis of the dominant paradigms: scientists provide a simplified framework of interpretation of reality and do not take into account all rel-

evant parameters and interactions. But a more holistic approach, that is an ecological and systemic approach, fits more with the concept of organic farming, aimed to serve environmental, animal, human and societal health. Researchers in organic farming systems need to cooperate with all related biological and social science disciplines using both inter- and trans-disciplinary methods.

Creative partnerships between research and farmers will open up new markets in low-income regions as well as creating options for agro-ecological actors. Organic food is poised to catapult from a niche into the mainstream. Traditional family farms in developing countries are a key growth sector for organic food production. Organic can be considered as the most advanced form of ecology-based farming, capable of nourishing people sustainably in the future.

The promotion of organic agricultural research implies a paradigm shift away from conventional reductionist methodologies – with a limited scope on certain technological improvements – to more holistic research approaches and innovative partnerships that better capture eco-societal system dynamics. Such innovative partnerships, involving existing conventional institutions, will not only create new agricultural opportunities for low-income regions, but also contribute to an acceleration of organic market development such that organic food marketing becomes mainstream. Since organic agricultural research is mainly financed through public funding, increased organic market development – together with local food security and sustainable rural development – must be seen both as an essential outcome of organic research but also as precondition to justify private and public investments into this area. The important on-going international sustainability discussions related to climate change mitigation, food security and food safety are likely to increase investment into organic agriculture.