Technology Platform 'Organics'

Vision for an Organic Food and Farming Research Agenda to 2025

Organic Knowledge for the Future

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Organisations to become members of the Technology Platform ‚Organics':

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Eurogroup for Animals, www.eurogroupforanimals.org

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European Council of Young Farmers, www.ceja.org

European Environmental Bureau, www.eeb.org

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FoEE, Friends of the Earth Europe, www.foeeurope.org

FSC, Fondation Sciences Citoyennes, http://sciencescito-yennes.org

GENET European NGO Network on Genetic Engineering, www.genet-info.org

IFOAM EU Group, International Federation of Organic Agriculture Movements, www.ifoam-eu.org

ISOFAR, International Society of Organic Agriculture Research, www.isofar.org

Schweisfurth-Stiftung, www.schweisfurth.de

Members of the European Parliament in support of the Research Vision:

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Monica Frassoni, Member of the Committee on the Environment, Public Health and Food Safety

Roberto Musacchio, Vice Chairperson of the Temporary Committee on Climate Change

Friedrich-Wilhelm Graefe zu Baringdorf, Vice Chairperson of the Committee on Agriculture and Rural Development

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July 2008

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1 Preface

Scientific research is one of the main driving forces behind the endeavour to find solutions to the key problems facing society, to develop innovations and to ensure growth, employment and the competitiveness of the EU economy. The EU has therefore set up a number of Framework Programmes (FPs) as the main financial tools through which it provides support for research and development activities covering almost all scientific disciplines. FP7 is currently underway (2007 to 2013) and bundles all research-related EU initiatives under a common roof in order to achieve the above aims.

Organic food and farming systems are a promising and innovative means of tackling the challenges facing the EU in the area of agriculture and food production. Organic production has stimulated dynamic market growth, contributed to farm incomes and created employment for more than three decades now. At the same time it delivers public goods in terms of environmental protection, animal welfare and rural development. Furthermore, the innovations generated by the organic sector have played an important role in pushing agriculture and food production generally towards sustainability, quality and low risk technologies.

Thus, it is in the common interest to invest in organic agriculture and food research, in order to improve and further develop both the system itself and the entire organic food chain.

Technology platforms (TPs) have proven to be a powerful instrument in bringing together a wide range of stakeholders to identify the research priorities in a given sector. Technology platforms are industry-led but also involve the financial sector, public authorities, the research community and civil society. Their potential is widely acknowledged by EU institutions.

There are 34 different TPs so far, but none of them deals with agriculture and public goods in general or with organic food and farming in particular. This omission was pointed out by the European Commission at the conference "Towards Future Challenges of Agricultural Research in Europe" in Brussels, 26-27 June 2007. Zoran Stančič, Deputy Director General of DG Research said: *"The technology platforms and the SCAR Working Groups have shown their capacity to break down research challenges to specific fields covering the 4 Fs: Food, Feed, Fibre and Fuel. In some areas, however, we are lacking appropriate platforms, for example in public goods oriented research or organic agriculture."*

Consequently, the IFOAM EU Group (representing the organic sector), in close cooperation with ISOFAR, initiated a process aimed at developing a vision for innovative research activities for organic agriculture and food systems with a strong focus on providing public goods. Relevant partners, organizations and Members of Parliament have joined the process.

This document is the result of an intensive, participatory 14-month long discussion and consultation process whose purpose was to ensure a transparent process and to broaden the legitimacy of the vision:

The Vision Camp held in Hagenthal-le-Bas, France, in June 2007 formed the basis for the first draft of the Vision Paper. More than 30 farmers, processors, retailers and scientists discussed different scenarios for agriculture and food systems in the year 2025, positioned the organic industry

within that context and debated concepts that might meet the major challenges of the future.

After an internal consultation process involving experts, the revised document was twice opened up to broader public electronic consultation (November to December 2007; April to May 2008) among various stakeholders.

The vision document was presented and/or discussed at a number of events, including the EU Commission advisory group on organic farming in November 2007, the IFOAM EU Organic Congress in Brussels (December 2007), Biofach 2008 and the Organic World Congress in Modena (June 2008).

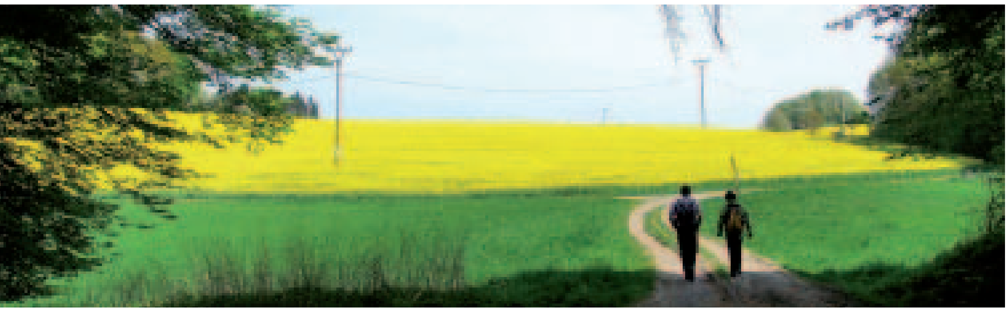
The newly established EU stakeholder forum, consisting of interested EU organizations and observers from the Commission, discussed the vision draft in considerable detail in June 2008.

In July 2008, a group of experts made a final check of the document.

Parallel to this process, a Technology Platform entitled "Organics" was established with a focus on sustainable food systems and public goods, and will be officially launched in autumn 2008. In addition to the above-mentioned organizations, various key EU stakeholder organizations have joined the platform (see members of the platform). It is hoped that, in addition to the organic sector, broad support can be secured from civil society organizations. Various members of the European Parliament have expressed their support for the platform. Discussions with further interested organizations are currently underway. Greater participation on the part of individual farmers and companies is also foreseen.

The platform has an official framework, a work structure and a work flow (see chapter 9). Members of the organic agriculture movement, the scientific community and wider civil society will be asked to contribute on a voluntary basis to the work of the TP. The secretariat of the Technology Platform is located at the IFOAM EU Group office in Brussels, and a platform coordinator ensures the coordination of the platform activities. A strategic research concept and a research action plan will be the final outcome of this ambitious endeavour.

The Technology Platform will tie together the research priorities which have to be communicated directly to the EU institutions. The vision and the TP will be presented to the European Commission in due course. This presentation will showcase the enormous innovative thrust of organic food and farming research – an innovation that is to the benefit of European society as a whole – and will help to identify research priorities.



2 Executive summary

Research is one of the most important tools for the further development and spread of organic food and farming. It is thus important that the EU research programme provides adequate support for organic food and farming research. Organic agriculture and food production are innovative learning fields for sustainability and are therefore of special interest to European societies.

This Vision Paper was prepared between June 2007 and August 2008 on the basis of wide-ranging discussions with farmers' organizations, scientists, organic traders and retailers, and EU-wide umbrella organizations representing a variety of commercial, non-commercial and civil interests. The Vision Paper i) shows the strengths and weaknesses of organic food and farming, ii) identifies five global and European challenges and trends on which food and farming research should focus, iii) groups the strategic priorities of future research and iv) highlights a large number of specific research activities for the future.

Organic agriculture and organic food represent a fast growing sector of the European economy; organic is one of the most promising "lead markets". The EU is a world leader in terms of research and knowledge transfer, legal and regulatory frameworks for the organic industry, food processing, certification, trade (import as well as export) and consumption. In order to maintain a leading position in this innovative political and economic field, research activities are crucial.

The "Vision for an Organic Food and Farming Research Agenda 2025" has identified the following crucial challenges and trends in agriculture and food supply:

- Availability and stability of food as well as access to it (a global challenge with major implications for European agriculture and food supply).
- Dependency of agriculture and food supply on non-renewable energy sources, especially fossil fuels.
- Depletion of natural resources and destruction of regulating, cultural and supporting eco-system services.
- Migration away from the countryside and industrialization and alienation in food chains.
- Increasing demand for high quality and value-added food.

The strengths and weaknesses of organic food and farming as currently practised are identified in this paper. Organic agriculture is a multifunctional and highly sustainable method, economizing natural resources and internalizing environmental problems; it has many positive impacts on the diversity of landscapes, farms, fields and species. Ethical values, such as the welfare of humans and animals, are high on the agenda, and participation of stakeholders as well as individual responsibility figure prominently along the food chain. Organic agriculture is especially suited to the empowerment of local economies without any recourse to trade barriers. High quality food and sensible nutrition are inherent elements of organic foodstuffs, so that organic nutrition is a beacon for modern lifestyles and nutrition.

This paper outlines three strategic research priorities for agricultural and food research, which will move both the organic industry and our society forward and make a considerable contribution towards developing a sustainable European way of

ensuring economic prosperity and the well-being of its citizens.

The vision for the future role of organic agriculture and organic food systems in European society encompasses:

- Viable concepts for the empowerment of rural economies in a regional and global context.
- Securing food and ecosystems by means of eco-functional intensification.
- High quality foods – a basis for healthy diets and a key for improving quality of life and health.

Research activities based on organic food and farming systems can contribute greatly towards the overall sustainability of agriculture and food production. Such research strongly integrates stakeholders in decentralized knowledge and expert systems, and is based on strict system integration and holistic analyses of interactions and trade-offs. In order to meet new challenges, it also explores all kinds of novel, smart and appropriate technologies and integrates them into organic food and farming systems wherever they serve to strengthen organic principles and practices.

It is intended that this vision paper should be used as a framework for the development of a strategic research agenda with clear priorities that will then lead to a research action plan for the organic industry and research community. For this purpose, a Technology Platform “Organics” will be launched in 2008 in order to facilitate and structure debates within industry and the scientific community.

The objectives of the “Vision for an Organic Food and Farming Research Agenda 2025” are ambitious. The need of a growing human population for an adequate and stable supply of food and fibre is addressed, as is the conservation of landscape amenity, biodiversity and fertile soils. The research ideas proposed in this vision are intended to promote productive farms and farming systems capable of coping with climate change by means of diversity and resilience. The dependency of food production on non-renewable resources - on fossil fuels in particular - has to be reduced.

However, sustainability in food production entails more than merely balancing economy and ecology. Its purpose is to ensure human well-being. Ethical and cultural issues are of equal importance in this vision. Ethical issues concern, for example, animal welfare, good governance and well-informed, independently-minded citizens who are capable of making decisions about the quality and the diversity of food they consume. In the context of sustainability, ethical farming, trade and consumption are existential issues for the human species[1].

[1] *Nick Clarke, Clive Barnett, Paul Cloke and Alice Malpass (2007) Globalising the consumer:Doing politicsin an ethical register. Political Geography, Volume 26, Issue 3, p. 231-249.*

3 Introduction

Organic food and farming is a steadily growing sector in the EU and around the world. It internalizes the environmental costs of agriculture and delivers numerous other public benefits, especially in the spheres of environment, management of natural resources and viability of rural areas. Organic farmers in Europe are entitled to agri-environmental payments in recognition of their agricultural practices.

Organic farming is also in tune with the expectations of a growing number of consumers who buy organic food despite the considerably higher prices. Consumers increasingly tend to prefer food with added value such as high quality, health benefits and animal welfare. The certification of organic foods is an EU quality scheme, a benchmark for quality worldwide.

The future challenges facing agriculture and food production are considerable. Organic farming is potentially able to respond to these challenges, both in the area of environment (mitigation of and adaptation to climate change, water and soil management, biodiversity and stable environments) as well as in the area of food (the need for sustainable production of high quality foods), rural development and animal welfare.

Agricultural Commissioner Mariann Fischer Boel has stressed on various occasions that the future of European agriculture lies in the production of high quality food, and that quality will be the key to a strong European food sector. In this context, organic food is the spearhead and lead market for high quality and high value foods.

However, It is worth remembering that EU organic production is in competition with both conventional food and global organic food production. Its competitiveness therefore depends greatly on innovation, novel appropriate technologies and scientific evidence in support of its superior qualities.

Thriving and innovative organic food and farming research will be one of the most important tools for meeting these expectations and making the most of opportunities.

Organic farming has brought innovation to all aspects of agricultural practice. Its systemic approach, coupled with inter- and transdisciplinary science and the concept of naturalness[2], are examples of this influence. More practical examples are disease prevention in animal husbandry, diversification of landscape elements and bio-control techniques. Such innovation is also typical in food processing. Preserving naturalness, reducing additives and using gentle physical processes were ideas introduced by organic processors.

The potential for innovation on the basis of organic knowledge is considerable and its potential impact on public goods and services as well as on markets is also great. However, current spending on research and dissemination does not adequately reflect this potential.

This paper is intended to show the way towards a European organic food and farming research agenda that will help to meet the major challenges of the next twenty years.

[2] *Verhoog, H.; Matze, M.; Lammerts van Bueren, E. and T. Baars (2003): The role of the concept of the natural (naturalness) in organic farming.- Journal of Agricultural and Environmental Ethics 16, 29-49.*

4 Current situation in organic agriculture

4.1 Organic agriculture in the EU

Growing consumer demand for organic food and the consequent increase in organic production led to the introduction of Council Regulation (EEC) 2092/91 in 1991.

The organic industry is currently one of the most rapidly expanding sectors of the food industry in many European countries. On the basis of data provided by Padel et al. (2008)[3] it can be assumed that, in 2006, the European organic market grew by more than 10 percent, and that it was worth approximately EUR 14 billion. In many established European Markets (such as Germany and the UK) demand is growing considerably faster than supply.

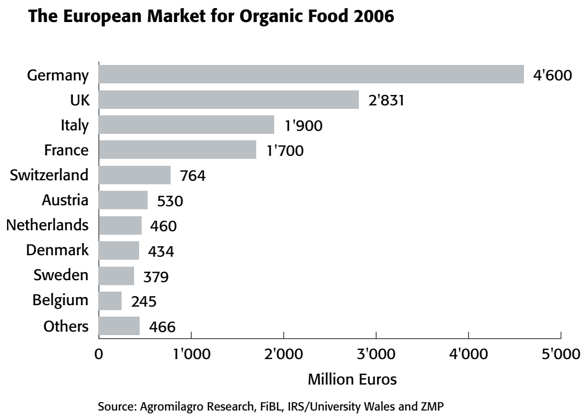


Figure 1: The European market for organic food 2006[3]

However, there are considerable differences in trends between the various countries. In 2006, production in most old member states accounted for up to 13% of total agricultural land[4]; more than 6.8 million hectares were under organic management in the EU (7.4 million hectares in the whole of Europe).

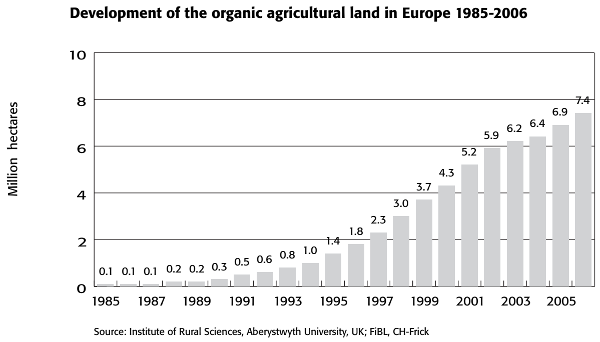
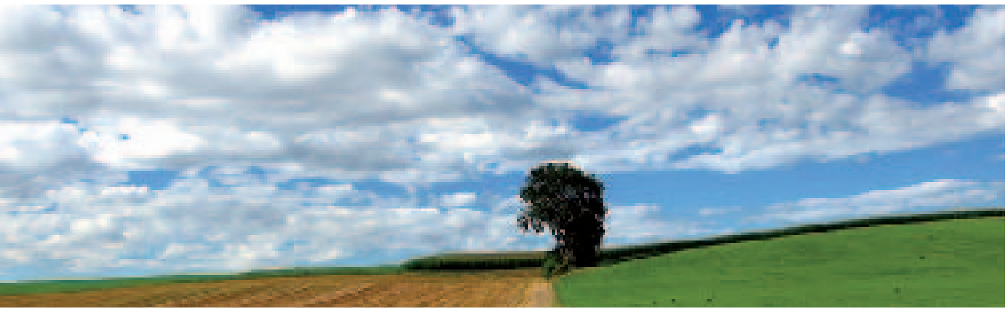


Figure 2: The development of organic land area in Europe[5]

Consumption of organic food is 4.5 to 5.5% of the total food market in countries such as Denmark, Austria and Switzerland. However, while the area of organic land has also expanded rapidly in many new EU member states as well as in candidate and potential EU candidate countries, with annual growth rates of up to 100%[6], consumption levels have remained very low in these countries (< 1%).

Organic farming is supported in most European countries in the context of rural development programmes[7]. Most EU27/EEA states have implemented area payments to support conversion to and (in most cases) continued organic production, with Bulgaria and Romania due to introduce support. However, payment rates, eligibility conditions and requirements vary considerably between countries[8]. In 2003, the average organic farming area payment was highest (EUR 404/ha) in Greece, reflecting the focus at that time on high value crops, and lowest in the United Kingdom (EUR 36/ha), reflecting low per ha payments on high areas of grassland. The EU15 average was EUR 185/ha. In the new CEE member states, the highest average area payment in 2004 was granted by Lithuania (EUR 274/ha), followed by Slovenia with EUR 243/ha. Compared with



the first year of organic farming support, the highest average area payment was recorded in Slovenia (EUR 226/ha) and the lowest in Latvia (EUR 21/ha), followed by Estonia (EUR 28/ha), Lithuania and Poland (both EUR 29/ha).

The need for further development of the sector has led to the elaboration of a new EU Council regulation, (EC) No 834/2007 on organic production and labelling of organic products, due to come into force in 2009[9]. This regulation also incorporates the objectives and principles of organic farming, similar to those developed by IFOAM, the International Federation of Organic Agriculture Movements.

Organic farming is an innovation that enjoys political support from all European governments. Some EU member states have even made the objectives of their support explicit, namely, that between 10 and 20 percent of total farm land should be organically cultivated in the near future[10].

4.2 Organic agriculture in the context of EU policy

The overarching strategy of the EU is described in the Lisbon Strategy initiated by Heads of State and Government in 2000: to make the European Union the most competitive and dynamic knowledge-based economy in the world by 2010. This strategy acquired a new focus at the 2005 Spring Summit[11], namely, increasing growth and creating jobs .

Organic food and farming systems can contribute significantly to achieving the aims of the Lisbon Strategy. As a fast growing economic sector, it provides new and attractive jobs in agricultural production, food processing and trading, inspection and certification, research, consultancy and training as well as in eco-tourism and the other services the growing number of organic farms and industries provide. Several European universities have recently started to offer Bachelors and Masters courses on organic food chain management, as they perceive this to be an important future market for their students. In many ways, organic food and farming systems combine traditional knowledge with new technologies, an approach which makes them especially attractive for Europe and one in which EU member states are already very competitive. Furthermore, the whole organic food chain is a very knowledge-intensive business that requires a large number of qualified people and enables those with wide-ranging experience to be trained. This food and farming concept provides great opportunities for economic growth and stability, especially in rural areas, on farms, in the area of tourism, services, education, crafts, trades and SMEs.

The sustainable management of biological resources is the underlying principle of European land, forest and marine management, as defined in many policy papers of the EU. It is, of course, the foundation stone of the Common Agricultural Policy, implemented in the Com-munity's Pillar 1 and Pillar 2 measures. At the Gothenburg Summit 2001, the European Council adopted the EU strategy for sustainable development and added an environmental dimension to the Lisbon process for employment, economic reform and social cohesion.[12]

In July 2002, the European Community adopted the Sixth Environment Action Programme[13], which establishes the environmental priorities for the European Union for the next ten years. Within the Framework of the action programme, four pri-

ority areas for urgent action were outlined: Climate Change (1), Nature and Biodiversity (2), Environment and Health and Quality of Life (3), Natural Resources and Waste (4). The implementation of these actions includes the preparation of seven thematic strategies such as soil, sustainable use of pesticides and sustainable use of resources.

In the area of biodiversity, the EU Community committed itself to halt the loss of biodiversity by 2010. In a follow-up to the 1998 EU biodiversity strategy, the European Union reconfirmed its commitment to the 2010 target during several official meetings. In 2006, the European Commission published its Communication "Halting the Loss of Biodiversity by 2010"[14].

At the beginning of 2006, the Commission adopted the "Action Plan on the Protection and Welfare of Animals 2006 to 2010"[15]. In the five main areas of actions, applied research on animal protection and welfare is given high priority.

Organic food and farming systems address, both holistically and practically, many of the European policies on the sustainable management of natural resources, the safeguarding of biodiversity and landscapes, environmental concerns and animal welfare.

4.3 Action plan for organic food and farming

In order to promote organic farming and support the organic food supply chain in particular, a European Action Plan for Organic Food and Farming was established in 2004 in which the specific benefits, not only for the environment but also for public health, social and rural development and animal welfare, were underlined. Among the 21 actions listed, action N°7 is to 'strengthen research on organic agriculture and production methods'[16]. In the Commission Staff Working Document of June 2004, the significance of new technologies, improved information exchange and suitable technology transfer to farmers for any policy aimed at developing the organic sector was stressed. Improved vertical cooperation between science, applied research, advisory services and farmers as well as horizontal synergies between Member States, were identified as approaches that stimulate progress. The Commission document also highlighted the major obstacles existing in the processing and distribution industry, where different technologies are required and expensive separation and tracking systems are needed, obstacles to be addressed by interdisciplinary food chain research activities.

4.4 Organic food and farming research in Europe

Research has a crucial role in the ongoing progress and dissemination of organic food and farming. Until the 1980s, research activities in organic farming systems were mainly carried out by private research institutes. In 1982, the first universities included organic farming in their curricula, and in the 1990s the first EU-funded projects on organic farming contributed to better co-operation among researchers of organic farming at a European level; at the same time, a growing number of national state research institutes became involved in organic farming projects.

Many national action plans include special programmes for organic farming research, e.g. the Federal Organic Farming Scheme (BOEL) in Germany (launched in 2002) and the Danish Research Centre for Organic Farming (DARCOF) in Denmark (in operation since 1996). With the ERA Net project CORE Organic, cooperation among the agencies funding research programmes has increased, and a joint call by the 11 countries involved was launched in 2006 with a common pot of at least EUR 3 million. In 2005, total national funding for organic food and farming research in these 11 countries was EUR 60 million.

Since the mid-1990s, several organic farming research projects have been funded under the framework programmes of the European Commission. Under the 5th framework programme, 11 organic farming projects were funded with a total sum of EUR 15.4 million (without national co-funding). Under the 6th framework programme, 9 organic farming projects were funded with a total sum of EUR 22.1 million (without national co-funding). There are indications that spending on organic research will remain the same under the 7th framework pro-gramme, which will last until 2012. Further policy-related research work is also done by the Joint Research Centre (JRC).

Scientific research addresses the bottlenecks in organic food and farming production. The objectives are i) to make organic food less costly, ii) to improve yields, iii) to increase extrinsic and intrinsic quality and organoleptical properties, iv) to avert food safety risks, and v) to achieve a major reduction in environmental, ecological and social costs.

These research objectives are basically the same for other food and farming systems such as integrated agriculture, soil conservation no-till farming and others. As the requirements and standards of all these approaches are very specific, the relevant techniques, processes and solutions are also very specific. Although many scientific findings are generally valid for all food and farming systems, each system needs a specific R&D programme – especially the organic system, where a technological gap exists and a huge backlog can be observed.

Relatively modest R&D activities in the last 20 years[17] – with the exception of some countries like Denmark, Germany, the Netherlands and Switzerland – have enabled food sales to reach EUR 14 billion in the year 2006 (see section 4.1), securing more than 1 million jobs. It can be expected that intensifying research in this growing economic sector will have an important economic and ecological impact upon European society in the near future.

3 *Padel, S., Jasinska, A., Rippin, M., Schaack, D. and Willer, H. (2008) The European Market for Organic Food in 2006. In: Willer, H., Yussefi-Menzler, M. and Sorensen, N. (Eds.) (2008) The World of Organic Agriculture. Statistics and Emerging Trends 2008. IFOAM, Bonn, and FiBL, Frick.*

4 *Llorens Abando, Lourdes and Elisabeth Rohner-Thielen (2007) Different organic farming patterns within EU-25. An overview of the current situation= Statistics in focus, 69/2007, Eurostat, Luxemburg, Available at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-07-069/EN/KS-SF-07-069-EN.PDF*

5 Willer, H., Yussefi-Menzler, M. and Sorensen, N. (Eds.) (2008) The World of Organic Agriculture. Statistics and Emerging Trends 2008. IFOAM, Bonn, and FiBL, Frick.

6 Llorens Abando, Lourdes and Elisabeth Rohner-Thielen (2007) Different organic farming patterns within EU-25. An overview of the current situation= Statistics in focus, 69/2007, Eurostat, Luxemburg, Available at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-07-069/EN/KS-SF-07-069-EN.PDF

7 Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agri-cultural Fund for Rural Development (EAFRD). Official Journal of the European Union, L 189 (20.7.2007), 1-23. Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005R1698:EN:NOT

8 TUSON J. und LAMPKIN, N. H. (2006): D2 report detailing national and regional OF policy measures in EU states and Switzerland. EUCEEOFP project deliverable to European Commission. Aberystwyth: University of Wales. Unpublished.

9 *Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. Available at http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/l_189/l_18920070720en00010023.pdf*

10 *Schmid, O., Dabbert, S., Eichert, C., Gonzálvez, V., Lampkin N., Michelsen, J., Slabe, A., Stokkers, R., Stolze M., Stopes, C., Wollmuthová, P., Vairo, D. and Zanoli, R. (2008) Organic Action Plans: Development, implementation and evaluation. A resource manual for the organic food and farming sector. FiBL and IFOAM-EU Group. ISBN 978-3-03736-022-4.*

11 *Spring summit 2005, http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/84335.pdf*

12 *Göteborg European Council 2001, PRESIDENCY CONCLUSIONS http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/00200-r1.en1.pdf*

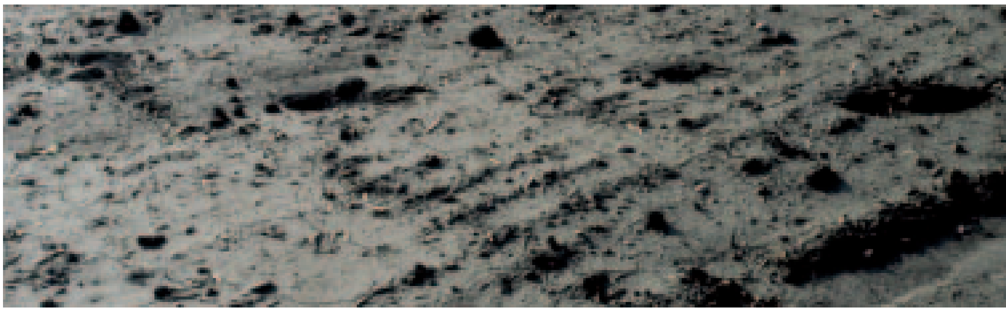
13 *DECISION No 1600/2002/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 July 2002, Sixth Community Environment Action Programme, http://europa.eu.int/eurlex/pri/en/oj/dat/2002/l_242/l_24220020910en00010015.pdf*

14 *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0216:FIN:EN:PDF*

15 *http://europa.eu.int/comm/food/animal/welfare/com_action_plan230106_en.pdf*

16 *European Commission, 2004: European Action Plan for Organic Food and Farming [COM(2004) 415 final] http://ec.europa.eu/agriculture/qual/organic/plan/comm_en.pdf*

17 *Watson et al (2006) Review: Research in organic production systems, past, present and future. Journal of Agricultural Sciences 146:1-19.*



5 Foresighting future challenges and trends for agriculture and food production.

Future challenges and trends for agriculture and food supply have both local and global dimensions. The following studies and reports by various commissions were especially relevant as background information for the development of this research vision:

- FFRAF report: foresighting food, rural and agri-futures[18]
- Millennium Ecosystems Assessment[19]
- Reports from the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)[20]

Taking the two major "Climate shock" and "Energy crisis" scenarios, the FFRAP report emphasized the severe dependency and vulnerability of European agriculture as a result of inefficient resource use and environmental impacts, which could lead to a disruption of conventional production systems. The "Food crisis" scenario highlights the advantages of citizen-oriented research, which is aimed at generating socially-driven, environmentally effective products, processes and services. Finally, the "Cooperation with nature" scenario projects an ideal situation in which science and technology have been deployed effectively to ensure sustainable development at all levels.

The "Millennium Ecosystems Assessment", initiated by UN organizations, the World Bank, many civil society organizations and private and public donors, found a *"substantial and largely irreversible loss in the diversity of life on Earth"* as a consequence of the *"growing demands for food, fresh water, timber, fibre and fuel",* a development which will *"substantially diminish the benefits that future generations obtain from ecosystems."* The Millennium Ecosystems Assessment report stressed the need for significant *"changes in policies, institutions and practices"* in order to meet the challenge of *"reversing the degradation of ecosystems while meeting increasing demands for their services"*.

The IAASTD reports came to a number of crucial conclusions regarding the ways in which Agricultural Knowledge, Science and Technology (AKST) can address global challenges: *"Successfully meeting development and sustainability goals and responding to new priorities and changing circumstances would require a fundamental shift in AKST, including science, technology, policies, institutions, development capacity and investment. Such a shift would recognize and give increased importance to the multifunctionality of agriculture, accounting for the complexity of agricultural systems within diverse social and ecological contexts. It would require new institutional and organizational arrangements to promote an integrated approach to the development and deployment of AKST. It would also recognize farming communities, farm households, and farmers as producers and managers of ecosystems. This shift may call for changing the incentive systems for all actors along the value chain to internalize as many externalities as possible"*.

In addition to these three studies on current problems, future scenarios for agriculture and food systems and the associated role of science and technology development, studies on consumer perception and behaviour indicate that major trends are occurring in the global food industry, with a growing preference in particular for foods with added value (premium quality, diversified or authentic tastes,

functional food, credibility and traceability, fairness to producers, animals and ecosystems)[21, 22, 23, 24].

One of the scenarios developed in the foresight study for the Standing Committee of Agriculture Research (SCAR) in 2006 placed an emphasis on such changes among European consumers (see the scenario "We are what we eat"). This scenario highlights the advantages of research and technology which address the real needs and concerns of citizens regarding social, environmental and lifestyle processes and services.

The "Vision for an Organic Food and Farming Research Agenda 2025" addresses the following challenges and trends in agriculture and food supply:

- Availability and stability of food as well as access to it (a global challenge with major implications for European agriculture and food supply).
- Dependency of agriculture and food supply on non-renewable energy sources, especially fossil fuels.
- Depletion of natural resources and destruction of regulating, cultural and supporting eco-system services.
- Migration away from the countryside and industrialization and alienation in food chains.
- Increasing demand for high quality and value-added food.

18 http://ec.europa.eu/research/agriculture/scar/pdf/foresighting_food_rural_and_agri_futures.pdf

19 http://www.millenniumassessment.org/en/index.aspx

20 http://www.agassessment.org/

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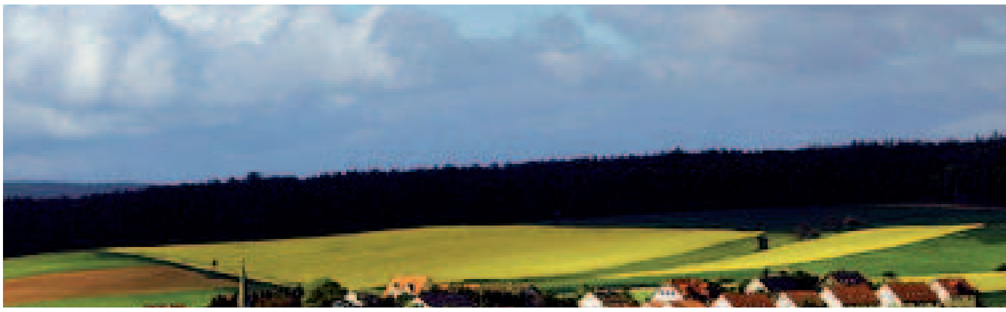


6 Organic agriculture and food production in the context of global challenges and changing food trends

"The human species, while buffered against environmental changes by culture and technology, is fundamentally dependent on the flow of ecosystem services. Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling." Millennium Ecosystem Report.[19]

The Millennium Ecosystem Report described the trade-offs between ecosystem services with an economic value (especially food, timber and fibre) and other ecosystem services, equally important but not (yet) marketable. In favouring the former, 60% of the latter have been destroyed in the course of human history. It will become a challenge for our society to find ways of halting or reversing the degradation of ecosystem services by changing methods of agricultural production.

Section 6.1 outlines the state of the art of literature concerning the relative environmental and ecological benefits of organic agriculture.

6.1 Environment and ecology

Environmental and ecological benefits are among the strengths of organic farming – and an important reason for consumers' preference for organic products. State support for organic farming in the context of agri-environmental programmes is based on evidence of environmental benefits, and the OECD and the EU take the share of organically managed land as an indicator for the "environment friendliness" of a country[25, 26]. Thanks to the existence of long-term, on-station comparisons (plot experiments), field and farm comparisons (pairs, small and large sample comparisons), landscape comparisons and large-scale modelling of quantitative and qualitative data from habitats on conventional and organic farms, we have a reasonably extensive understanding of the ecological and environmental impacts of different farming systems:

6.1.1 Reduced pollution

Nitrogen leaching rates in organic arable fields were reduced by 35 to 65% when compared with conventional fields (various European and US studies[27, 28]). Herbicide and synthetic pesticide residues in soils, surface and ground water do not occur as their use is completely banned.

In a 30-year field experiment in Switzerland, the active matter of sprayed pesticides in organic arable crop rotation was only 10% that of the identical integrated[29] and conventional crop rotations[30] (in the organic crop rotation, copper, plant extracts or biocontrol agents were used, while in the integrated and conventional crop rotation herbicides and pesticides in compliance with IPM standards were used).

6.1.2 Biological and physical soil properties

Several European, US, Australian and African studies show higher organic matter content, higher biomass, higher enzyme activities, better aggregate stability, improved water infiltration and retention capacities and less water and wind erosion in organically managed soils when compared with conventionally managed ones[31, 32, 33, 34, 35, 36, 37].

Most recent studies show that organic cropping with shallow ploughing is as good as no-till cropping for the prevention of soil erosion and the improvement of soil structure[38, 39].

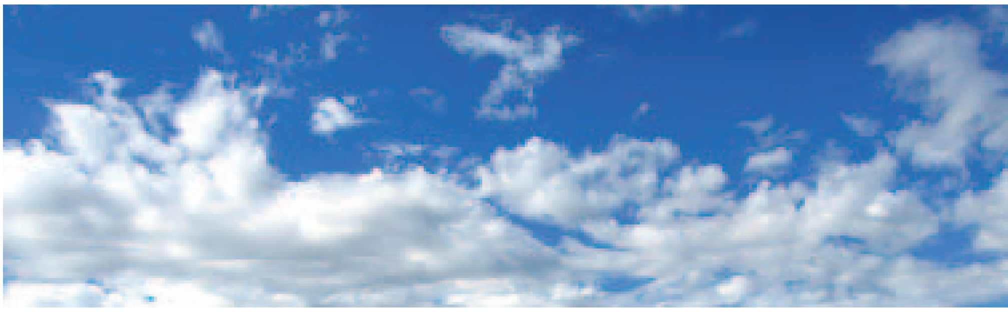
6.1.3 Biodiversity

Diversity is an inherent quality of organic agriculture. At farm level, diversity refers to the variety of farm activities, diverse grassland ecotypes, site-specific crop rotations with high numbers of crops in sequence, and the integration of livestock into cropping systems[40]. These organizational measures have a positive impact on the diversity of flora and fauna and contribute to the stability of ecosystem functions[41].

Positive impacts on biodiversity are also the result of reduced use of fertilizers, mechanical weeding, and disease and pest management techniques.

The establishment of an organic production system needs to consider aspects such as landscape complexity in order to ensure that sufficient seminatural landscape elements are present to serve as sources of natural antagonists (e.g. planting hedges, sowing wildflower strips, installing beetle banks)[42]. Soil quality management (e.g. amendment with compost), tillage practices (e.g. conservation tillage), host plant resistance, crop rotation, and intercropping are important additional measures to lower risks of pest and disease outbreaks. It is therefore a crucial economic interest of organic farmers to enhance diversity at all levels, because organic weed, pest and disease management would fail without a high degree of diversity. Organic farming has been shown to promote more species and a greater abundance of organism groups than conventional farming[43, 44], in particular greater species diversity and density of insects, plants and soil micro-fauna. Nonetheless, some taxa are not significantly affected[45, 46] and need special measures on organic farms as well. An overriding determinant of biodiversity may be habitat diversity, rather than management practices[47]. Quality standards for sustainable landscape management in organic agriculture, including checklists, were developed in an EU concerted action project in the 3rd Framework[48].

The potential of genetic diversity at crop level for stabilizing low input farming systems and for enabling adaptation to environmental changes is understood theoretically but is far from being used in practice. Specialists consider the genetic diversity of crops to be a fundamental resource for adaptation and therefore crucial for the stability of food supply[49]. As resistance to environmental stress (robustness) is a multigenetic characteristic, in-situ conservation and on-farm breeding is likely to be more successful than genetic engineering. A large number of very small initiatives by plant and animal breeders in the context of organic farms exist, all of them scattered around the world. These initiatives urgently need political, scientific and



economic support.

6.1.4 Climate change

Organic farming techniques such as shallow ploughing, recycling of livestock manure onto arable cropland, composting techniques, integration of green manure, catch crops and cover crops, agroforestry and alley farming as well as diversified crop sequences all reduce soil erosion considerably and lead to increased formation of soil humus. This often results in considerable annual carbon gains (between 40 kg and 2000 kg of C per hectare[50, 51, 52]).

Higher soil organic matter content as well as greater diversity at landscape, farm, field, crop and species level might help organic farmers to adapt more effectively to increasingly unpredictable weather conditions both locally and globally.

The ban on nitrogen from fossil fuels and its replacement by leguminous and organic nitrogen reduces CO_2 emissions considerably. For some crops and livestock products such as cereals, grass-clover and milk this results in a lower total emission of greenhouse gases (GHG) per kg product in organic compared with conventional systems; for other crops with relatively low yields such as potatoes, however, the organic system needs further improvement to reduce energy use and GHG emission per kg of product[53].

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6.1.5 Water shortage

In organic farming, water use is likely to be more sustainable due to better rain infiltration and higher water retention rates[54, 55]. In the Rodale experiment in Pennsylvania, for example, corn and soybean yields where highest in the organic plots in dry years. In a broadacre experiment in the province of Tigray in Ethiopia involving several thousand farmers, yields were increased through composting and organic farming, due mainly to improved water conservation capacities[56].

6.1.6 Fossil fuel shortage

In US agriculture, 36% of energy is used in the manufacture of inorganic fertilizers and pesticides (see Figure 3). On organic farms, energy use is generally lower, as these inputs are not used. More energy input could be replaced on farms, in particular by replacing petrol (for the operation of field machinery and for transportation) by agro-diesel deriving from anaerobic fermentation of organic waste. Potentially, organic farms could become net energy producers.

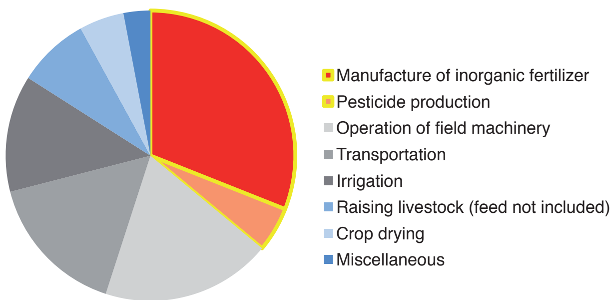


Figure 3: Energy use in US agriculture[57]

6.2 Socio-economic impacts

6.2.1 Farm economy

On average, profits from organic farms are in the range of +/- 20% of the profits of the respective conventional reference farms[58]. Relative profits may vary substantially among farm types and regions. Especially high profits can usually be found on mixed farms, whereas organic pig and intensive cattle fattening farms in particular are often less profitable under organic management due to high feeding costs and possible changes in the housing system[59, 60].

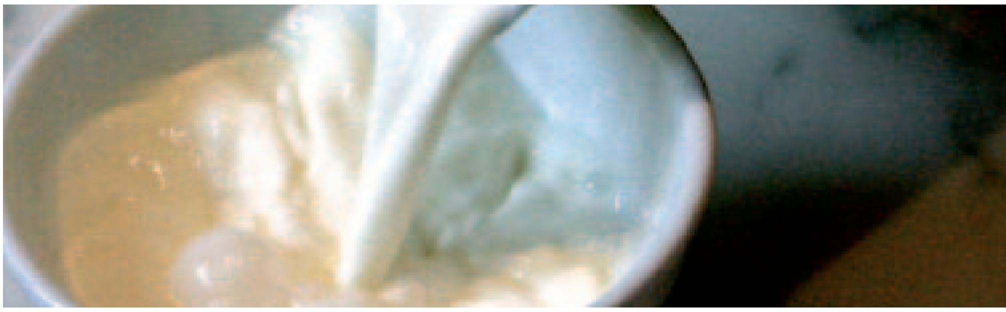
Impact assessment of the 2003 CAP reform and other decoupling policies on the financial performance of organic farms indicates that recent agricultural policy changes have been beneficial for organic farms[57, 58, 61, 62].

The determinants of profitability are generally very similar to those of conventional agriculture[63]. Differences in yields, producer prices, the total amount of direct payments received, variable and labour costs are most commonly mentioned as factors determining the differences in financial performance between organic and non-organic farms[58, 62].

6.2.2 Social impact

Higher demand for labour in organic farming generates more employment per farm[64, 65]. This effect is often found to be associated with high value enterprises (e.g. horticulture) and/or on-farm retailing/processing[58, 66].

There is some contested evidence that organic farming can enhance job satisfaction and happiness for farmers, their families and their work-



ers[66, 67, 68, 69]. Organic farms may rely less on migrant labour but there is no requirement for or guarantee of this. Occupational health may be improved due to reduced exposure to agricultural chemicals, but this may be offset by the effects of manual labour[61, 68, 69].

Organic farmers are younger, more educated, have a broader range of skills and engage in knowledge transfer activities. More women are engaged in organic farming and food[70, 71, 72].

Returns to labour on organic farms are similar or higher, where premium prices and support payments are high enough to compensate for reduced output and receipt of Pillar 1 payments. The combination of similar or higher incomes and employment contributes to rural economic development, and this may be strengthened by added value activities such as direct marketing, processing and tourism, particularly if linked to organic food production. Higher farm incomes and a positive farm development perspective can result in strengthening the role of agriculture in rural development[60, 73].

Organic farming initiatives can have a catalyzing effect on innovation in rural development[71, 75, 76]. There is anecdotal evidence suggesting that organic farming generally contributes to the quality of life in rural areas as well as to diversification, the strengthening of regional identities, to landscapes and the local cultural heritage, and that it fosters links to rural tourism[77].

6.3 Food quality and safety aspects

Generally, consumers attribute positive qualities and characteristics to organic foods. Such attributions include the following: healthy, tasty, authenticity, "lives up to its promise", local, highly diverse, fresh, low in processing, whole food, natural, free from pesticides, antibiotics and GMO, low in nitrate content, safe and certified. These attributions are often interwoven with expectations of the production process, including elements such as environmental impact or animal welfare[78, 79]. This positive perception is global and – although not always backed up by actual buying and eating behaviour – is an asset for the further development of sustainable agriculture and food systems.

Several meta-studies[80 a-h] confirm many of these quality claims for organic food. These meta-studies agree on organic products from plant origin concerning the following qualities[81]:

- Organic plant products contain markedly fewer value-reducing constituents (pesticides, nitrates); this enhances their physiological nutritional value.
- Organic plant products are just as safe as conventional products as regards pathogenic microorganisms (mycotoxins, coli bacteria).
- Organic plant products tend to have a higher vitamin C content.
- Organic plant products tend to have higher than average scores for taste.
- Organic plant products have a higher content of health-promoting secondary plant compounds.
- Organic plant products tend to have lower protein content.

Health claims are generally not substantiated by scientific research, even in cases where the organic production system provides inherent nutritional advantages (e.g. higher contents of bioactive com-

pounds in fruits and vegetables [secondary metabolites[82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93]], or higher contents of fat-soluble vitamins or polyunsaturated fatty acids in organic milk or meat[94, 95, 96, 97]. These findings were also verified by a recent UK study involving 25 farms. Nutritionally desirable CLA, omega-3 fatty acids, vitamin E and carotenoids were increased in milk from organic farms with grazing dairy cows[98]. These compounds have all been linked to a reduced risk of cardiovascular disease and cancer. By contrast, less desirable fatty acids (i.e. omega-6 fatty acids and CLA10) were not increased in organic milk, which helps to improve the crucial ratio between the two.

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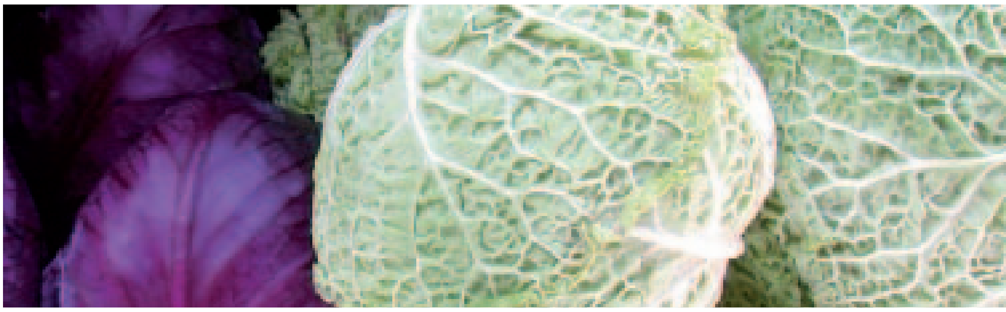

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7 Weaknesses, technology gaps and research needs in organic agriculture

7.1 Productivity gap

Yields on organic farms are generally lower than those on conventional or integrated farms. The magnitude of these yield differences varies considerably in the literature. A compilation of data from 5 European countries is given in Table 1.

	Switzer-land	Austria	Germany	Italy	France
Wheat	64 – 75	62 – 67	58 – 63	78 – 98	44 – 55
Barley	65 – 84	58 – 70	62 – 68	55 – 94	70 – 80
Oats	73 – 94	56 – 75		88	
Grain Maize	85 – 88		70	55 – 93	66 – 80
Oilseeds	83	78 – 88	60 – 67	48 – 50	67 – 80
Potatoes	62 – 68	39 – 54	54 – 69	62 – 99	68 – 79
Pulses	88	83 – 85	49 – 73	73 – 100	83

Table 1: Average yields of organic crops (as a percentage of conventional yields) for 5 European countries. Results from national surveys[99].

A recent meta-study modelled significantly smaller differences between organic and conventional yields from intensive farming in developed countries[100]. Based on 160 field experiments, the average yields of all crops grown organically were only 9% lower than those grown conventionally. As most of the data came from trials conducted on research stations, the actual productivity gap may have been underestimated in this meta-study.

On marginal soils and in less favourable climatic conditions, under permanent or temporary water stress and generally in subsistence agriculture, organic agriculture enhances food productivity[100, 101, 102]. In many situations, the adaptation of state-of-the-art organic farming[104] offers considerable potential for yield increase and yield stability.

All factors concerning the amount and stability of crop and livestock yields are crucial starting points for future research activities. The available data show a huge variability in yields from organic farms. This fact alone is an excellent basis for scientific progress. The organic approach involves optimizing the yields of different cross-linked farm activities rather than optimizing the output of single crop and livestock production units. One example of this is the fact that legume or legume-rich swards are used for three different purposes: i) for supplying nitrogen to crops, ii) for building up soil fertility and iii) for feeding ruminants (and replacing cereals). These aspects of overall productivity have to be taken into consideration both in organic and in other sustainable systems. Unfortunately, some critics of organic agriculture have not done so[105].

7.2 Energy use efficiency gap in special cases

Some areas of crop and livestock production exist in which organic techniques are still poorly developed and many practical problems not yet resolved. Difficult crops include potatoes, rape seed, some vegetables, grapevines and horticultural crops. In many of these crops, core pests or diseases are handled inadequately and weed regulation and nutrient management are too energy intensive. In many cases it is also a problem of the maladaptive traits of crops or livestock.

In livestock husbandry, there are conflicting objectives between energy efficiency, reduction of greenhouse gas emissions, nitrate loss and the requirement to respect the specific species-behavioural needs of animals (e.g. free range systems for

ruminants versus methane capture in buildings).

Thus, while assessments of the energy use of organic products (Table 2) are generally positive, in certain cases the assessment is negative, which has consequences for Global Warming Potential (GWP).

Restrictions on artificial inputs intended to safeguard the authenticity, naturalness and high quality of foods (e.g. synthetic amino-acids in animal feeds, genetically modified and optimised enzymes in food processing) might counteract highly efficient energy utilization.

Table 2: Energy use/tonne of organic production as a percentage of conventional crops

Forage 32%[109]
Wheat 50–87%[106, 107, 108, 109, 110, 111. 112, 113, 114]
Maize 59%[108]
Citrus 67%[115]
Apples 123%[116]
Potatoes 24–129%[106, 107, 108, 117, 118]

Livestock

Milk 46–87%[109, 113, 119, 120, 121]
Beef 65%[113]
Pig meat 87%[113]
Eggs 114%[113]
Poultry 132%[113]

7.3 High variation of ecological goods and services on commercial organic farms

Originally, organic food and farming was developed on the basis of the idea that "soil health" is important for improving human health. Organic systems developed further in response to the increased use of environmentally hazardous technologies and substances in agriculture and the associated acute, subacute and chronic health effects. Production and processing standards and the corresponding certification system effectively guarantee these qualities. Although the scientific evidence for many societal benefits of organic farming is overwhelming, many of these benefits are not directly assessed using indicators during certification. The more specific the problems are that society wants agriculture to resolve – e.g. sequestration of CO_2 into soils, reduction of GHG during production, the protection of birds and wildlife – the more important it is to have advanced certification systems that use simple but very effective indicators. These indicators have to be developed, tested and then integrated into the existing certification procedures, which at present mainly monitor inputs and technologies along the whole production process. The new certification procedure could combine input and impact specification and qualities without losing the systemic approach of organic farming.

7.4 High variation of food quality pattern on commercial organic farms

The observations concerning ecological goods and services in the previous section also hold true for quality patterns. In the course of certification procedures, the same basic requirements for organoleptical, nutritional and analytical qualities are applied as for conventional foods. For some critical compounds such as pesticides, nitrates, GMO, banned or restricted pharmaceuticals, processing aids and enzymes, stricter thresholds are applied by organic companies.

Further research is also needed with regard to the health status of livestock on organic farms. The concepts of health prevention in livestock production still lack scientific back-up and full implementation in organic practice on livestock farms[122]. Problems of subclinical mastitis are identical on organic and conventional farms[123, 124]. Holistic animal health concepts in which preventive measures, herd management systems and non-chemical veterinary medicines are applied have so far been established only on scientifically monitored pilot farms[125, 126]. As the health status of livestock has a considerable effect on milk and meat quality, animal health concepts must be placed at the top of the future research agenda.

Future certification systems will have to use indicators for quality claims, otherwise such claims are arbitrary, and consumers will react with disappointment if quality patterns vary too greatly. This will be especially relevant for analytical quality (desirable and undesirable compounds), nutritional value (such as bioactive compounds, etc.) and taste, freshness and gentle processing. Although these qualities are generally inherent to organic foods, they can not be guaranteed for consumers in all cases.

7.5 Fairness to all: The high price of organic food

Higher farm product prices are essential to main farm incomes, but they can result in higher consumer prices. This may lead to issues of affordability for low income households. However, when seen in the context of declining prices for food (food prices fell by 75% in real terms between 1974 and 2005[127]), current organic prices have been comparable, in real terms, to conventional prices in recent decades, while overall incomes have risen. Supply/demand factors and supply chain efficiencies are also relevant, and growing organic markets will have a positive effect on the price of products (that is, prices will fall).

IFOAM standards include social concerns, but there also is a paucity of social considerations in most organic standards[128]. Such ideals are strengthened where they are combined with fair trade certification: the organic/fair trade combination is often found on products from developing countries.

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101 *Pretty, J., Morison, J.I.L. and Hine, R.E. (2003) Reducing food poverty by increasing agricultural sustainability in developing countries. Agriculture, Ecosystems and Environment 95, 217-234.*

102 *Edwards, S. (2007): The impact of compost use on crop yields in Tigray, Ethiopia. Institute for Sustainable Development (ISD). Proceedings of the International Conference on Organic Agriculture and Food Security. FAO, Rom. Obtainable under: ftp://ftp.fao.org/paia/organicag/ofs/02-Edwards.pdf*

104 *State-of-the-art organic farming is based on soil fertility, diversified crop rotations, mix cropping or agroforestry, on improved recycling of nutrients and organic matter, on improved habitat management (push-pull strategies for pests, promotion of beneficials, different management strategies to reduce initial inoculum or the increase of diseases) and readily available bio control agents, phytoextracts or physical methods).*

105 *The Economist (2006) Good Food? Why ethical shopping harms the world. December 9th – 15th.*

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116 *Geier, U., Frieben, B., Gutsche, V. and Koepke, U. (2001) Oekobilanz des Apfelerzeugung in Hamburg: Vergleich integrierter und oekologischer Bewirtschaftung. Schriftenreihe Institut fuer Organischen Landbau Bonn, Verlag Dr. Koester, Berlin.*

117 *Alfoeldi, T., Maeder, P.. Schachenmann, O., Niggli, U. and Besson, J.-M. (1995a) Energiebilanzen fuer verschiedene Kulturen bei biologischer und konventioneller Bewirtschaftung. In: Dewes, T. and Schmitt, L. (eds.) Wege zu dauerfae-higer, naturgerechter und sozialvertraeglicher Landbewirtschaftung. Wissenschaftlicher Verlag, Giessen, pp 33-36.*

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126 *CORE Organic project ANIPLAN – minimizing medicine use in organic dairy herds through animal health and welfare planning. www.coreorganic.org.*

127 *http://www.economist.com/opinion/displaystory.cfm?story_id=10252015*

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8 A vision for 2025: Strategic research priorities to address the major challenges facing European and global society

Up to now, research projects and national framework programmes on organic agriculture have addressed immediate technology gaps in organic agriculture and food production. This has been politically expedient and has given rise to a greater number of producers and professional skills for the task of serving unexpectedly fast growing consumer-driven markets. Thus, many organic research projects had a short term perspective only.

In contrast to this, the present paper takes a long-term perspective on the research needs of organic agriculture and food systems. The focus of this vision extends far beyond optimizing this attractive and successful niche market: it is aimed at securing food supply and simultaneously safeguarding ecosystems (see Figure 4). The three strategic research priorities focus in particular on the inconsistencies between economy, ecology and social cohesion in agriculture and food production and propose research activities and insightful learning concepts for organic and other farming systems.

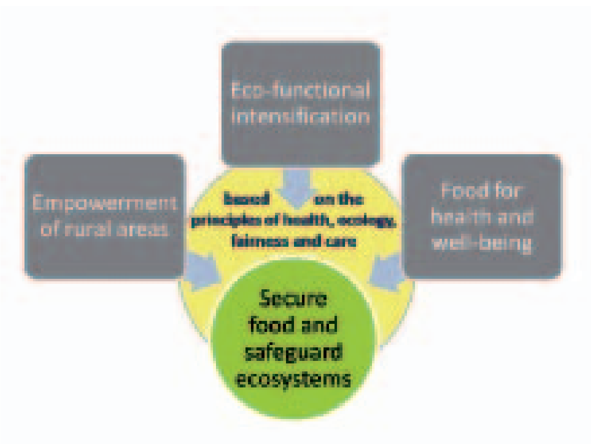


Figure 4: Vision for 2025: Strategic research priorities for food and farming research

Agricultural and food research are systems sciences that predominantly apply interdisciplinary and transdisciplinary methods and observe and learn from long-term impacts in complex contexts[129]. Moreover, agroecological systems are characterized by emergent properties such as self-regulation, synergies or antagonism, and are open to environmental and human influences[130]. Therefore, conducting research on more complex entities such as herds, plant societies, farms or landscapes is crucial to an understanding of how farming techniques can be improved in a sustainable way[131]. Accordingly, communication among stakeholders and scientists is indispensable.

Taking into consideration the major challenges human society will face over the next 20 years, we identified three priority fields of research: (i) eco-functional intensification of food production, (ii) empowerment of rural areas and economies, and (iii) production of food for health and human wellbeing (Figure 4). These three priority fields will be defined and explained in sections 8.1 to 8.3.

The magnitude and diversity of problems and challenges outlined by foresight studies and various future scenarios (see chapter 5) indicate that agriculture and food production are based on distinctive ethical and cultural values and not only on scientific and economic feasibility. This is especially true for rural development and decentralized food production (e.g. food sovereignty), the quality of landscapes, the conservation of biodiversity, the sustainable use of natural resources as well as fair trade, green jobs and animal welfare.

Organic agriculture is strongly and explicitly based on ethical values based on the underlying

principles of health, ecology, fairness and care[132]. These principles provide a unique basis for developing complex assessment and decision-making tools and for modelling future sustainable food and farming systems in a practical context in which stakeholders along the whole food chain are able to participate and civil society is closely involved in technology development and innovation.

The following features in particular should be considered in organic research projects in order to improve the impact of science on sustainability:

- The long-term effects of technology, innovation and human impacts on agro-ecological systems and socio-economic contexts are taken into consideration.
- The active participation of stakeholders, especially at farm level, is characterized by decentralized patterns of responsibility and decision making.
- There is a transparent flow of information along the food chain and effective management of knowledge, including tacit or indigenous knowledge.
- There is an explicit, collective understanding of ecological cycles, finite resources and precaution as a principle in technology assessment.

The ethical approach to scientific research activities outlined in the four principles of IFOAM will be a constituent part of each research priority.

8.1 Viable concepts for the empowerment of rural economies in a regional and global context

The socio-economic challenges

8.1.1 Our vision for 2025

By 2025, new concepts, knowledge and practices will halt or even reverse migration from rural areas to urban centres. A diversified local economy will attract people and improve livelihoods. Organic agriculture, food processing and eco-tourism will become important drivers of the empowerment of rural economies. The dialogue between urban and rural populations will improve considerably and intensified forms of partnership between consumers and producers will emerge.

8.1.2 General rationale

The empowerment of local economies will be an important trend in European agriculture and food production. This may be linked with regional food chains, complementary to addressing issues of fairness and efficiency in the globalization of food chains. Empowerment can be described as *"a critical integrating mechanism for bringing together the social, economic and institutional construction of power, both in and through rural (as well as urban) spaces. This is cross-cutting both vertically through supply chains and laterally through community and institutional interfaces"*[133]. Such an empowerment will concern both the producer and the consumer ends of the supply chain, both of which have been increasingly excluded from the active design of the food supply system.

Regionally produced raw materials pos-

sessing specific qualities will increase the diversity of European food in a major way (and will combine the traditionally high diversity with cutting-edge technology). Wellness, high quality food, locally processed foods from traditional recipes and geographical denomination will create jobs and wealth in rural areas and will add to their attractiveness. Small and medium-sized farm operations as well as food producers located in climatically or site-specifically less favourable, marginalized or remote regions will be able to find markets and add local economic value. Such regionally based agriculture and foods will become one important part of the culinary culture and well-being of European citizens and an addition to the well established trade in bulk commodities, such as grains, meats, dairy products and fresh produce. New forms of cooperation will create more direct relationships with consumers, and learning and negotiation will build on and contribute to participatory and value based research and development activities. This will help to address the challenges of fair distribution of value along the food supply chain, from both the consumers' and the producers' point of view. Stakeholders who help to boost local food production will also contribute to other sectors of the economy and to public services. Such trends will strengthen local identities and promote rural tourism, creating further potential for green jobs that service the non-farming community. Migration away from the countryside can only be halted or reversed by economic incentives, and agriculture is one of the driving forces in this. Revitalized rural economies are especially important for the future of the new EU member states.

8.1.3 What specific role could organic agriculture and food production play and what public goods could it deliver for the empowerment of regional economies?

In this growing trend towards empowering local economies, organic agriculture will play an important role. It is a low-risk and high-value agriculture with an excellent tracking and tracing system, and its principles and added value are easy to communicate to other actors and partners in rural areas.

Parallel to strengthening rural economies, agricultural activities in urban and suburban environments and contexts will become more important, either as learning and demonstration activities (farms and livestock holdings as 'outdoor' classrooms, farmers as experts for sustainability, nature and rural life, promoting healthy "green care", the fast growing range of therapies involving farm animals, plants, gardens or landscapes) or as commercial activities (self-picking, urban and peri-urban agriculture and gardening). Such semi- or neo-agricultural activities will be organic or nearly organic, with closed nutrient cycles, ecologically improved habitats, biological plant protection, composting and free-range husbandry systems. All these productive activities will increasingly contribute to food security and poverty reduction, not only in developing and emerging countries but also in some areas of Europe, especially in new EU member states.

The specific techniques of organic agriculture and food production – especially low input fertilization and pest management, diversified crop rotation and farm activities, outdoor livestock systems, higher genetic diversity of crops and live-

stock – as well as its specific processing methods (traditional, minimal and gentle) enhance qualities such as 'authenticity' and typical taste, reconnect products to their local origin and tend to influence positively taste and sensory quality[92]. Organic farming is a highly knowledge-based form of agriculture involving both high tech and indigenous knowledges and is based on the farmer's aptitude for autonomic decision making. These are crucial skills in locally complex contexts and in food scenarios characterized by unpredictability and disruption[18].

Organic and sustainable farming took up the multifunctionality concept very early on and exerted a considerable influence on mainstream agriculture and food production through partial improvements in quality and added value characteristics (e.g. integrated farming, functional foods with scientifically substantiated health claims, highly focussed ecological programmes, including no tillage agriculture, free-range and welfare friendly programmes for livestock, programmes for the reduction of CO_2 emissions, conservation programmes for birds and wildlife in conventional environments). This forerunner role as pioneer is very beneficial to society and contributes towards adjustments in technology development and innovation. As conflicts loom larger and trade-offs become more difficult in agriculture and food production, truly multifunctional approaches such as organic farming will offer relevant solutions or will at least provide exciting fields of learning for the future.

Organic farmers are especially good at using direct sales channels such as local farmers markets, farm shops, box schemes, house delivery and Internet marketing. Several organic traders already make successful use of the Internet to make farming and food quality perceptible and also to communicate with consumers in remote locations. These skills could be useful in bridging the gap between farming and non-farming populations.

8.1.4 Examples of research ideas

Further development of organic principles and dissemination of the underlying ethical values.

Development of methods for assessing food and farming systems in relation to the core principles of organic agriculture (health, ecology, fairness and care) (*).

Identification of procedures on how ethical values and principles can be better rendered operational in setting rules within the regulatory framework (*).

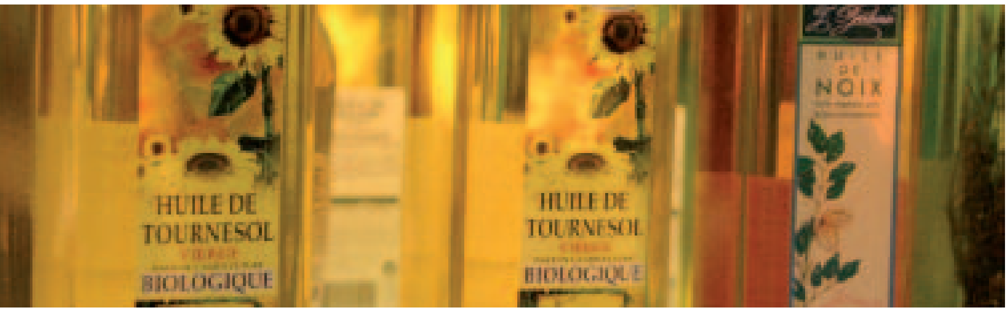
Creating a space for dialogue between all stakeholders such as consumers, producers, processors and other agents in the food supply chain.

Improved methods for knowledge transfer and exchange of best practice. "Training the next generation". Development of participatory guarantee systems in regional contexts (*).

Methods for improved communication and sharing of values in global and long-distance food chains on the basis of negotiation between equal partners (*).

Development of models for new economic and social forms of cooperation such as CSA (community-supported agriculture), local box schemes, regional food webs, community supported local food processing units etc. (*).

Development of models for cooperation be-



tween regions (*).

Ecological, economic and social comparisons of models of regional cooperation and competition in agriculture.

Potential and consequences of localized and regionalized food systems, including assessment of differences in diets and of the extent to which consumers' demands are satisfied across seasons.

Assessing the social and economic implications of different models for fair trade (*).

The mixed farm of tomorrow: Closing local and regional circuits of nutrients and organic matter. Improved integration of welfare friendly livestock systems in crop rotations and agro-ecosystems.

Development of localized and renewable energy production in rural areas, including sustainability assessments of technology and social, economic and environmental impacts.

Innovative forms of learning through communication and collaboration within global networks of actors in regionalized and local food chains (*).

Economic and social implications of different types of multifunctional livelihoods combining organic farming with green jobs related to nature conservation, guiding, training and gardening, green care etc.

External costs and degree of internalization of different types and intensities of regionalized and global food chains. Documentation of social and economic impacts at local and regional levels (*).

Assessing social sustainability, working quality and quality of life of supply chain actors (*).

Modelling of different scenarios for European agriculture, such as high quality organic food, mass production of food, feed, fibre and fuel or multifunctional farms (ecological, social and economic impacts).

Obstacles in international trade of organic food (*).

Conflicts and trade-offs of organic and sustainable agriculture in developed and developing countries (food security, domestic markets and exports, environmental and nature conservation policy, natural resource management). Impacts from increasing imports of organic food from developing countries on the economic development of developing countries (cost-benefit analyses) (*).

Reduction of costs of organic foods along regional, national, European and international food chains (*).

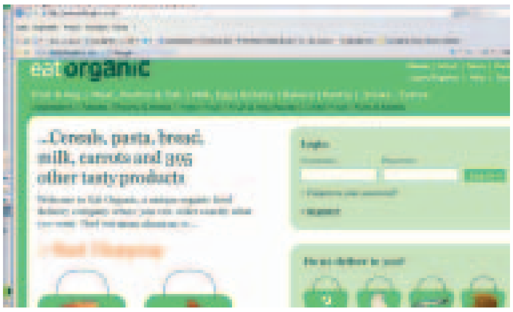
Development of approaches for successfully integrating people (farmers, industry, consumers, civil society) in the research programmes using participatory and action research methodology (*).

Transition management: learning and knowledge exchange in complex agricultural and food systems (*).

Developing appropriate indicators and procedures in certification systems to monitor the delivery of public goods (*).

Integrating farmers actively into regional development projects (e.g. Leader program, Organic Region, Ecotourism).

(*) Project ideas in which participation of partners from developing and emerging countries would be especially attractive.



Example of a research project:
The farmer-consumer partnership of tomorrow

The alienation of consumers from agricultural production causes societal, economic and ecological problems. For the first time in human history, more people live in urban areas than in rural ones. In many regions of the world, it is becoming critical to maintain a good and attractive civil infrastructure in rural areas; skilled farmers and entrepreneurs are becoming a rarity. Mutual understanding is on the wane, a fact which promotes unrealistic perceptions on both sides along with a decoupling of food consumption from seasonality and regionality, a rise in food scares and ignorance of how to handle food and its potential risks. This also leads to imperfect market orientation, as agriculture as a whole is not close enough to urban consumers. In short, there is a necessity for new forms of communication between consumers and producers and a need to reconnect urban, peri-urban and rural communities.

Modern communications tools and new forms of trade could help to achieve this aim. There are already Internet tools available which use the data from the traceability of organic certification and the batch number of processors, traders and retailers for reconnecting food buyers to food producers and processors. Examples include www.natureandmore.com or www.bio-mit-gesicht.de.

Food trading via the Internet – in combination with box schemes – provides new opportunities for remote farmers to gain direct market access and helps to establish new partnerships. Self-picking, community supported agriculture, local food nets etc. are other approaches on the increase.

All these new opportunities can be fully exploited on the basis of interdisciplinary and transdisciplinary research, including economic analysis, ecological footprints (LCA), information and communication research, corporate social responsibility and learning concepts.

8.2 Securing food and ecosystems by eco-functional intensification

The ecological challenges

8.2.1 Our vision for 2025

By 2025, the availability of food and the stability of food supply will be noticeably increased through eco-functional intensification, and access to food will be considerably improved thanks to revitalized rural areas (see 7.1). Knowledge among farmers about how to manage ecosystem services in a sustainable way will be much greater, and animal welfare and environmentally sound farming will be cutting-edge technologies in food production.

8.2.2 General rationale

There are 6 billion people living in the world today and although agricultural production has been intensified by all available means (with severe impacts on ecosystem services), 850 million people are still starving (FAO). The UN predicts that the human population will increase to 9 billion in 2050. If current trends continue – such as changes in eating habits (towards meat and dairy diets, obesity and malnutrition, high proportion of wasted food), the uneven production and distribution of food, as well as poor governance in many countries – a 50% increase in global food production will be needed to secure food supply. Parallel to this tremendous in-

crease in food production, a considerable reduction in the negative impacts of agriculture on the environment, ecosystem services and the use of non-renewable resources and energy would become prerequisites for human survival. These emerging conflicts show how important the societal, political and economic framework will be if current trends are to be reversed (see societal and economic challenges under 7.1). Any successful strategy for the future development of European agriculture will have to minimize trade-offs between the different services agriculture is expected to deliver. In parallel, legal or voluntary quality requirements with respect to the environment, ecology and animal welfare will become more important.

8.2.3 What specific role could organic food and farming play in eco-functional intensification of food supply?

Organic agriculture is one of the best developed multifunctional strategies in agriculture to date. Organic farmers strive to achieve high overall productivity while at the same time coping quite successfully with limited natural resources, low energy input and high environmental standards. Increasingly, social and ethical standards are also part of organic practice.

The weakness of organic agriculture so far remains its insufficient productivity and the stability of yields (see 6.2.1). This could be solved by means of appropriate "eco-functional intensification", i.e. more efficient use of natural resources, improved nutrient recycling techniques and agro-ecological methods for enhancing diversity and the health of soils, crops and livestock. Such intensification builds on the knowledge of stakeholders (using participatory methods developed under 7.1) and relies on powerful information and decision-making tools in combination with new research tools in the biological sciences. Eco-functional intensification is characterized by cooperation and synergy between different components of agriculture and food systems, with the aim of enhancing productivity and the health of all components.

Intensification

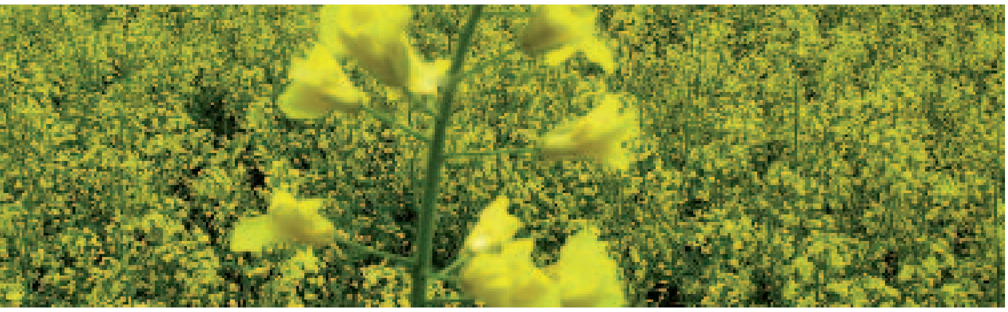
Intensification in conventional agriculture is understood primarily as using a higher input of nutrient elements and of pesticides per land unit. It also means more energy (direct for machinery and indirect for inputs). Finally, it focuses on better exploiting the genetic variability of plants and animals; to do so, all available breeding techniques, including genetic engineering, are used.

Eco-functional intensification *means, first and foremost, activating more knowledge and achieving a higher degree of organization per land unit. It intensifies the beneficial effects of ecosystem functions, including biodiversity, soil fertility and homeostasis. It uses the self-regulating mechanisms of organisms and of biological or organizational systems in a highly intensive way. It closes materials cycles in order to minimize losses (e.g. compost and manure). It searches for the best match between environmental variation and the genetic variability of plants and crops. It also means increased livestock welfare, with a positive impact on the health and productivity of animals. It uses and provides more farm labour per land unit, principally such of high quality and professional satisfaction. Knowledge is the key characteristic of eco-functional intensification.*

Eco-functional intensification is not exclusive to organic agriculture but is most widely used there, because its requirements rule out other means of intensification. It offers a huge opportunity to produce more food without compromising the quality of the environment, the quality of foods or the life quality of farmers and the welfare of farm animals. Finally, eco-functionally intensified production systems are more resilient and highly adaptive to the unpredictability of climate change scenarios.

8.2.4 Examples of research ideas

- Improved management of soil organic matter, soil micro-organisms for the improvement of nutrient supply, soil structure, soil moisture retention and soil health as well as pest and disease prevention (*).
- The development of systems (not only plants and animals) which are drought-tolerant, self-sufficient in nutrients and selfreliant as well as being resilient to pests, diseases and environmental and climate change (*).
- Better recycling of macro- and micro-nutrients and enhanced self-reliance in nitrogen supply through new farm and crop sequences, achieved by highly improved and reduced soil tillage techniques (*).
- Redesigned mixed farming systems (integration of livestock) with multiple objectives (*):
- Improved nutrient and organic matter cycles and diversified production systems (multi-cropping, agro-forestry concepts, grassland etc.). Making use of regional cycles including high quality sewage sludge.
- Integration of food and biogas production by intercropping, catch and cover crops and by the fermentation of manure and slurry prior to recycling.
- Development of innovative and competitive forms of collaboration between specialized farmers and enterprises (e.g. vegetable producers taking advantage of good crop rotations in livestock systems).
- Ecological habitat management as a key to more resilient and locally adapted farming systems (improved biodiversity through management at landscape, farm and field levels, crop rotation, buffer zones and diversified habitat in and around crops) (*).
- Improved techniques and products for the control of weeds, diseases and pests (e.g. biocontrol, phyto-pesticides, physical barriers) (*).
- New on-farm breeding concepts for livestock and crops, enhancing genotype-environment-management interactions and using smart breeding techniques such as markers and genome-wide selection (*).
- The use of holistic quality traits (vitality, health effects, robustness, tolerance etc.) in crop and livestock breeding. Improved selection procedure based on intuitive perception, visual selection[134], “skill in performance, acquired by experience, study or observation” . Scientific back-up for the concept of integrity in crop[136] and livestock breeding (*).
- The value of traditional genetic resources within plants and animals (with special emphasis on robust and multifunctional old traits and varieties) for organic agriculture (e.g. dual purpose chickens or dairy cows) (*).



Evaluation and development of novel technologies in the context of sustainable farm design and management (automation and robots, sensors in crop and livestock management, GPS and information technologies).

Development of new cropping and animal husbandry techniques, equipment and machinery which comply with organic principles and standards (e.g. wide row wheat production with legume intercropping requires considerable modification of farm implements) (*).

Assessments of resource use efficiency and greenhouse gas emissions, environmental impact of different agro-ecological methods and new farming systems.

Cross-disciplinary assessments of trade-offs and synergies between ecological intensification methods and their impact on the environment, food quality and the organic principles of health, ecology, fairness and care.

Development of suitable tools for effectively including ethical reflections and dialogue in decision-making.

Identification of procedures for rendering operational ethical values and principles in setting rules within the regulatory framework (*).

Assessing novel technologies in the context of sustainable production and processing systems (marker assisted breeding techniques, nanoparticles on inert surfaces in processing units etc.). Such assessments enable hazards to be reduced to a minimum in complex natural, semi-natural and agro-ecological systems (*).

Developing appropriate technologies that are readapted to people and resilient to human error instead of training people to respond adequately to imposed technologies (*).

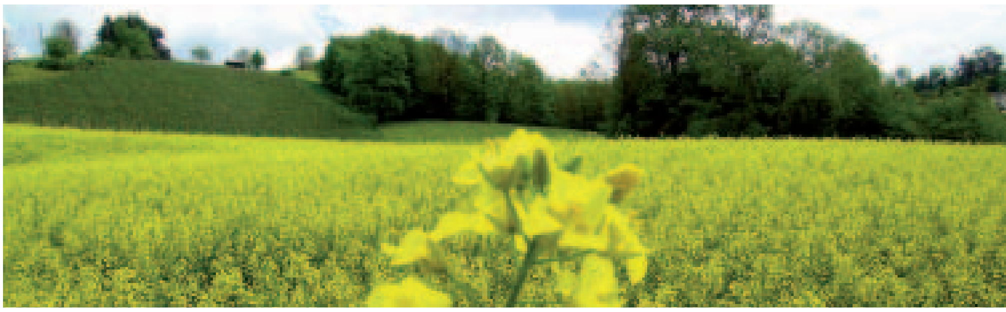
Developing appropriate livestock technologies and practices that foster welfare and take account of the ethological needs of farm animals while at the same time minimizing environmental impacts. (*).

Development of ethical and organic principles for the further development of animal husbandry.

Scientific basic of holistic concepts in livestock health (based on naturalness, prevention, management, alternative medicine use and breeding) (*).

Socio-economic analyses of such concepts, addressing problems of the transfer to veterinarians, farmers and agricultural advisors (*).

(*) Project ideas in which participation by partners from developing and emerging countries would be especially attractive.



Example of a research project:

Energy-independent cropping systems

Approximately 90 million tons of fossil fuel are used globally for the synthesis of nitrogen for agriculture (1% of global consumption). The fossil oil used annually on a 100 hectare stockless arable farm tops 17,000 litres of fuel each year when applying 170 kg nitrogen, which is common in many European countries. The nitrogen self-reliance of organic systems is a major advantage in times of fossil energy shortage[137].

The most important approaches used in enhancing self-reliance are i) the clever integration of leguminous plants into cropping and ii) the better use of nitrogen (and other nutrients) deriving from livestock production. Scientists from Michigan University modelled the potentially available nitrogen pool from the integration of leguminous plants in arable cropping systems to be 60% bigger than the current use of nitrogen produced using fossil energy – without reducing the food and feed production area[100].

Another approach for better utilizing the nutrient elements in the excrement of 18.3 billion livestock animals is to reduce the separation of crop and livestock production, which has often resulted in soil degradation on croplands[138] and nutrient excess in livestock operations, leading to as yet unsolved environmental problems (FAO statistics). In order to close the cycles of macro- and micro-nutrients and organic matter, we shall need either a new design of modern mixed farms or industrial livestock waste processing units, bringing the by-products back to cropland. New farm models that integrate livestock into cropland would be a solution for many regions in Europe. As farm technology has completely changed during the last 25 years, such mixed farms of tomorrow would not resemble the old models but would meet the demands of modern entrepreneurship as well as requirements regarding the environment and animal welfare.

Example of a research project

Resilience of agro-ecosystems – a key to adaptiveness to climate change

Agricultural production worldwide will face less predictable weather conditions than those experienced in the past. Weather extremes will become predominant. Resilience will become an important property of agricultural production systems, given that many other adaptation techniques, such as breeding for changed environments, or irrigation, are time consuming or demand expensive investment[139].

Diversity could become a key to better adaptation to climate change – especially the diversity of crops, fields, rotations, landscapes and farm activities (a mix of various farm enterprises). Biodiversity is an important driving factor for system stability and a prerequisite for sustainable pest and disease management. The stability of agroecosystems can be optimized by implementing appropriate soil fertility[140], habitat management[141], landscape complexity (e.g. planting hedges, sowing wildflower strips, installing beetle banks)[142] and the genetic diversity of crops[143].

All these elements and the interactions among them need to be addressed in future research projects focusing on the adaptation of agricultural systems to climate change.

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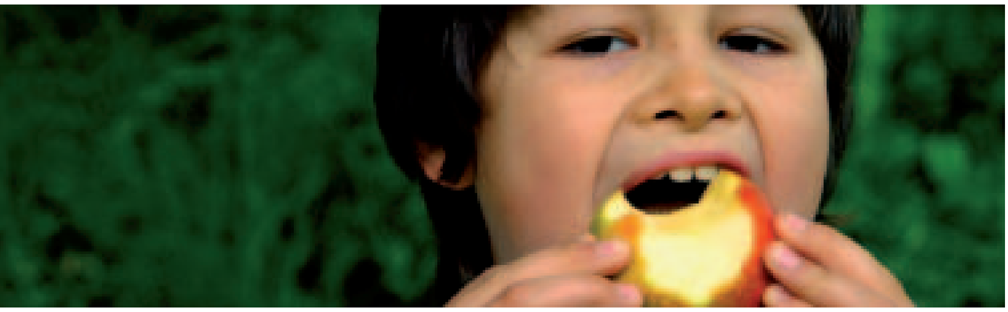


8.3 High quality foods – a basis for healthy diets and a key for improving the quality of life and health

The food challenges

8.3.1 Our research vision for 2025

By 2025, people will have more healthy and balanced diets. Food and quality preferences will have changed: fresh and whole foods will be the ultimate trend and processing technology will produce foods with only minimal alterations to intrinsic qualities. The specific taste and its regional variation will be more appreciated than artificially designed foods.

8.3.2 General rationale

Nutritional malfunction has become widespread in Western societies as well as in emerging economies in all parts of the world. Childhood obesity is one of the most serious public health challenges of the 21st century[144]. Other diet-related diseases such as cardiovascular disease, diabetes, caries and food allergies affect the physical and mental capacity of consumers.

Changes in eating habits prompted by various economic, social, societal and individual fac-tors, drive the demand for convenience foods, simplified and unbalanced diets, fast food and low-price community catering in schools, canteens and nurseries. Knowledge of how to produce and prepare food has decreased and there is a general lack of awareness of food[145].

Individual and social well-being strongly depend on both the quantity and quality of the food we eat, the composition of our diets and how food is processed and prepared. The power to choose foods that meet the highest standards of ethics and craftsmanship is a clear manifestation of every citizen's everyday control of his or her life circumstances and a key prerequisite for a long and healthy life. Therefore, improved quality of life is inextricably linked with an increased demand for food (and other goods) of the highest standard. Given this, consumers' dietary awareness will increase considerably, even going beyond classical issues such as food safety, residues and basic nutritional needs, especially if science succeeds in elucidating the role different aspects of food play in relation to health: "We are what we eat".

8.3.3 What specific role could organic food and farming play in providing high quality and healthy diets?

Organically produced and processed foods are a shining example of "high quality food" and are already standard among people interested in health and nutrition matters. This is also due to the fact that organic food is well regulated and certified by supranational and national standards. Moreover, organic foods are seen as being precisely those foods that guarantee sensible nutrition for children and adults.

The European Union is currently in a process of adopting actions to promote the consumption of fruits and vegetables: *"In light of the dramatic increase in obesity amongst schoolchildren […] to come forward with a proposal for a school fruit scheme as soon as possible based on an impact assessment of the benefits, practicability and administrative costs involved."*[146]. Consumers are especially

concerned about pesticide residues when eating fruits and vegetables. Therefore, the quality standards have become very high – see GlobalGAP – and the thresholds for pesticides residues tend towards zero. Organic quality matches these requirements best. In addition, health promoting compounds in fruits and vegetables are increased by organic production techniques (see section 6.1.3).

Generally speaking, promoting foods of vegetable origin is an important part of the organic lifestyle. Eating less meat helps to solve several problems simultaneously: i) it reduces diet related health problems, ii) it sets huge areas of fodder crops free for direct human nutrition and ii) it reduces environmental and animal welfare problems related to high stocking densities.

Organic foods are also perceived as tasty and as having structure and consistency; they are seen as authentic, involving no unnecessary processing. Organic foods do not contain flavour enhancers with addictive potential, and they do not use processing technologies which disrupt the body's perception of satiety. Several studies indicate that organic food has a positive effect on, for example, the immune system[147,148].

Organic means systemic in terms of the whole food chain approach. It also entails a systemic view of several quality indicators[149] for the purpose of improving new production methods and technologies. Thus, innovation is needed especially in relation to food processing, food storage and packaging. With R&D efforts in these fields, novel technologies will be developed and traditional ones improved, such as minimal and gentle physical methods that maintain the flavours, bioactive compounds or structure of the organic raw material[150]. Additives, enzymes and processing aids will be altered or replaced in line with organic quality standards. Such processing technologies render high quality processed or convenience foods competitive and are especially attractive for SMEs.

The diversity of flavours and tastes can be additionally enhanced by using "heirloom" varieties on organic farms. Many of theses products require adapted knowledge about handling, processing, packaging and transportation.

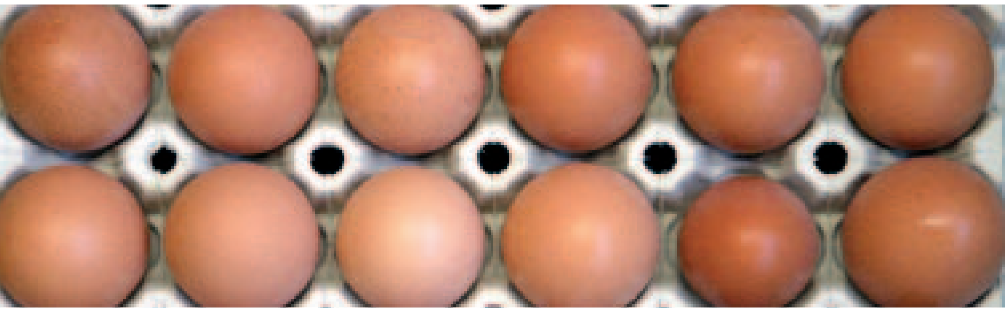
Buying and eating organic foods will become a basic component of modern eating culture and life style. It will be a part of changes that will markedly improve consumers' quality of life and health. In doing so, it contributes towards reducing public health costs. Organic food will become standard in food and nutrition education and in schools, hospitals, geriatric institutions and public catering. Organic food culture has the potential to be the driving force behind a sustainable, natural and healthy lifestyle.

8.3.4 Examples of research ideas

Defining and validating basic concepts related to perceptions of organic food and health (e.g. food quality, authenticity, naturalness, wholeness, integrity, vitality, self regulation, robustness, resilience).

Development of references for the basic concepts, through controlled trials in plant and animal production.

Improvement of systemic indicators for high quality organic food (e.g. freshness, naturalness, structure, taste).



Development and validation of methods for testing organic food quality indicators.

Development and validation of methods for safeguarding the authentication of organic food.

Improved and more consistent food quality in organic and low input plant and livestock production systems (through breeding and farm management techniques).

Understanding the links between organic farming practices and food quality indicators (*).

Novel or adapted technologies for safeguarding organic food quality during transport and storage (*).

Novel or adapted technologies for safeguarding organic food quality in processing and packaging, including technologies for convenience and fast food processing (focusing on minimal and gentle physical methods as well as on alternatives to additives, enzymes and processing aids) (*).

Whole food chain quality and hazard analysis of critical control points in organic production.

The applicability of isotopes analysis and other cutting-edge diagnostic tools in combination with process certification. Integrating animal welfare assessment into the certification scheme.

Ecological footprint (LCA) of different food qualities, different processing technologies and different food chains.

Regionality, biodiversity, climate change and consumption of organic food (*).

Quality differentiation by heirloom products and old breeds (*).

Connections between food and cultural heritage (*):

Eating behaviour, consumer preferences and buying patterns relating to organic food, also in relation to different socioeconomic and cultural milieus (*).

Consumer perceptions of organic food quality indicators.

Links between the eating behaviour, diet, well-being & health of humans and organic production systems.

In vitro research: Development of test models of small organisms (e.g. bacteria, nematodes) or cell-lines, to study the effects and related working mechanisms of (organic) food on specific physiological functions.

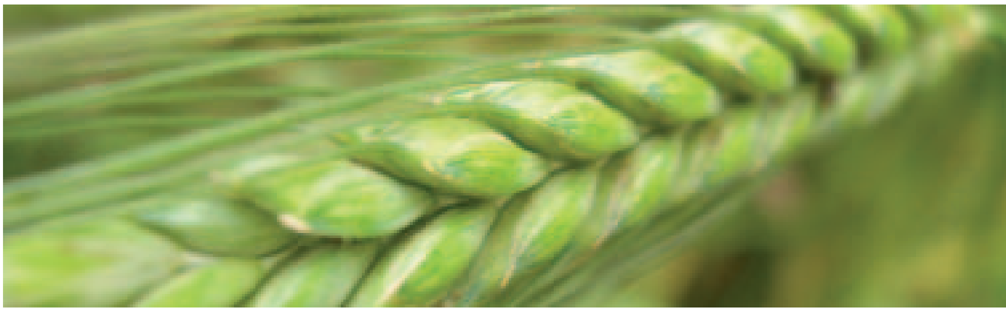
Development of test models of small organisms as a "vitality measurement tool" for (organic) food products.

Observational (epidemiological) studies in humans to explore links between organic food consumption and health.

Intervention studies in animals to define biomarkers for health, including aspects such as resilience, robustness, behaviour and long term survival on organic feed. Results from in vitro-research should be compared with results in larger animals.

Intervention studies in humans need to include challenges (such as vaccinations or viral infections) and study the recovery of the subjects, as well as mental well-being and functioning. Results from in vitro research should be compared with results in humans.

(*) Project ideas in which participation by partners from developing and emerging countries would be especially attractive.



Example of research activities

Holistic food quality research

In organic food science, a process-related concept of food quality is applied. The qualities sought by a growing number of consumers are strongly influenced by many factors along the entire food chain – from field to fork. Therefore, it is necessary to identify the most critical steps within the chain which influence the quality of food and to be aware of the factors through which quality can be positively or negatively altered. Special qualities such as taste, authenticity and naturalness of foods can be sustained on this basis. Since the aim of organic farming is to supply the consumer with vital and healthy food, processing technologies are adapted according to specific quality indicators. Most of these quality indicators are new in food quality science and need scientific back-up. Health studies (e.g. feeding trials, intervention studies, observational studies and in vitro research) need to be carried out to define bio-markers for health research in order to test and hopefully confirm public expectations regarding the health and disease prevention properties of organic food. The design of these studies should reflect the systemic approach of organic farming, including the four principles of IFOAM. Basic concepts such as food quality, authenticity, naturalness, vitality and health will be worked out and validated, so as to safeguard the high standards to which organic agriculture aspires.

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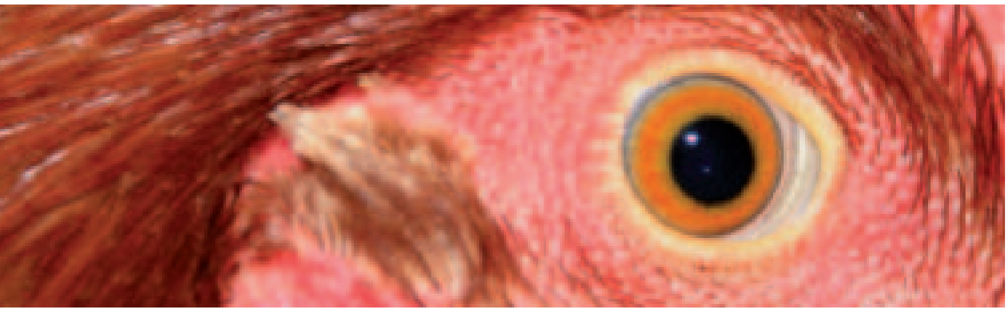

9 Next steps

A Technology Platform (TP Organics) will be the long-term vehicle for hosting and facilitating the future debate on how research strategies can be continuously adjusted and how they might be translated into concrete research programmes and projects.

The TP Organics will involve many EU umbrella organizations, guaranteeing the broad involvement of a wide range of stakeholders representing many parts of European civil society. So far, 15 EU organizations have signed up to participate. In the years to come, the network of national partners, European regions, governmental schemes and more business partners will be extended.

The Technology Platform Organics will be organized in a simple and effective way:

- A stakeholder forum with advisory groups.
- A steering group.
- A secretariat.

9.1 Stakeholder forum/advisory group

This is a forum for all TP partners. It advises the Steering Group on the overall objectives of organic food and farming research and on themes and priorities. It also proposes chairs and vice chairs for the working groups and helps to identify people for working groups and specific work tasks. It can also present ideas for platform themes for the attention of the Steering Group and Secretariat.

The stakeholder forum is open to non-governmental organizations operating throughout the EU, to representatives from governments, and to relevant companies and business partners. Observers from EU institutions will be invited to meetings.

9.2 Steering Group

The Steering Group takes all necessary decisions (official positions, appointments for working groups and its chairs). It gives strategic guidance to the Secretariat and evaluates and monitors quality. It decides on the platform activity plan and the annual business plan. The steering group further decides on the membership of organizations in the TP. It advises and assists the Secretariat on communication and financial aspects.

The Steering Group comprises representatives from CEJA, EEB, the IFOAM EU Group and ISOFAR. Plans exist to appoint a representative directly from industry and from the consumer associations.

9.3 The Secretariat

The Secretariat will be hosted by the IFOAM EU Group in Brussels. It consists of a platform coordinator and a secretary. The task of the Secretariat is to ensure a good work flow and to manage the platform activity plan. Furthermore, it develops a PR and a communications strategy, prepares platform meetings and events and engages in advocacy work for the platform.

9.4 Working groups

The working groups are appointed by the Steering Group and coordinated by the Secretariat. They are open to all member organizations. The working groups are organized according to the three research priorities. For each working group a chair and a co-chair is to be appointed by the Steering Group. The working groups interpret and discuss the research priorities and develop a strategic research agenda and associated action plans.

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