



International Federation of Organic Agriculture Movements
EU Regional Group

POSITION PAPER

“Organic farming in the 7th Research Framework Programme of the EU”

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Boosting Innovation in Organic Farming: Food Systems for Ecological Integrity, Human Health, Animal Welfare and Product Quality

Executive Summary

The European Commission recognises organic farming as an important way towards attaining the CAP reform objective of promoting environmentally friendly quality products. In recent years the economic importance of organic agriculture has grown considerably in many countries in Europe as well as outside Europe. On the 4th of June 2004, the European Commission adopted the 'European Action Plan for Organic Food and Farming' "in order to facilitate the expansion of the organic farming sector and also to increase its production capacity with new information and, above all, new technologies". Out of the 21 actions decided by the Commission in the European Action Plan for Organic Food and Farming, "strengthening training and research at all levels, from the adoption of research programmes in universities or other research bodies, to on-farm training to ensure suitable technology transfer to farmers" was one of the crucial policy instruments.

Unlike conventional agriculture and food systems, organic farming has not yet profited from massive efforts by either public research or sector specific R&D. This is particularly relevant in the new EU member states, where growth of both production and consumption is highest at the moment and many scientific and technical problems could be solved in shared research activities and exchange of knowledge. Furthermore, the multiplication effect of organic farming research for the whole agricultural sector is considerable as it is the prototype for a sustainable food system and is highly efficient also in producing secure and high quality foods.

General basic and applied agricultural research cannot cover all the research needs of the organic food and farming systems. The need for interdisciplinary approaches and complex models is distinctive for this field of research.

IFOAM recognizes the efforts which have been already made by the European Commission to support several research and development projects for organic agriculture in the former 5th and 6th Research Programmes. As the economic importance of organic agriculture has grown considerably in many countries in Europe as well as outside Europe, it is important that this support does continue and is even strengthened in the 7th Research Framework Programme by allocating significant funds to research for organic food and farming systems. This would allow European research to keep its leadership and competitiveness in one of the rare innovative fields of agriculture and food and would contribute to achieving several goals of different EU level policy strategies. This could be facilitated through a European Technology Platform for Organic Agriculture and the inclusion of specific relevant research topics in organic agriculture and food systems in several thematic areas in the new 7th Framework Programme.

The paper describes in detail the most important research and development topics of immediate priority (including the rationale for giving support and their EU context), which are listed below:

- Organic / low-external-input farming and biodiversity.
- Organic / low-external-input farming and climate change.
- Analysis of national implementation of the CAP reform 2003 and of rural development plans, regarding the impact on organic farming.

- Organic farming and requirements of the Green Box (WTO).
- Psychological and sociological barriers of consumers and market actors along the supply chain, in dealing with organic food.
- Food quality – actual dietary behaviour – health – public health costs.
- Food processing technology for premium and organic foods, in order to support innovation of SME.
- Improving the quality, the ecological, technical and economic performance of organic and low-external-input crop production systems through breeding.
- Co-existence and organic farming.
- Improving animal health, product quality and performance of organic and low-input livestock systems through breeding.
- Innovation in the field of alternative or complementary medication in organic livestock systems.

Furthermore, beside these main topics of immediate importance, a number of other research topics have been identified in different areas. Examples of such topics are in the fields of:

SOCIO-ECONOMIC TOPICS: Development of attitudes of different relevant societal groups and actors towards organic agriculture and consequences for future actions; Combining “regionality”, food-origin and organic farming in European agriculture; Socio-economic analysis of different forms of co-operation between farms; Consolidated data on consumer behaviour with regard to organic food (European consumer panel); Development of procedures and tools for a more flexible implementation of the organic regulation 2092/91 in response to regional variation.

QUALITY, HEALTH AND FOOD SECURITY: Enhancing health-promoting properties of organic food and optimising its organoleptic quality parameters; Reducing costs of different standard-setting and certification schemes for organic food; Food security and organic food.

ENVIRONMENT: Organic / low-external-input farming and nutrient losses and recycling.

LIVESTOCK PRODUCTION: Improving husbandry systems which respect to animal welfare; Comparing and optimising the immune system, stress tolerance, stress recovery and problems with zoonoses under different environments and under different rearing systems; Sustainable organic dairy production free of antibiotics; Need for and alternatives to synthetic vitamins in organic animal husbandry.

PLANT PRODUCTION: Soil health and its link with plant health in organic and low-external-input farming systems; Supporting and facilitating innovation in the field of novel pesticides suited to organic farming; Prevention and control of pests and diseases in Mediterranean organic agriculture.

IFOAM recommends that several of these topics would be clustered, to emphasise the whole system approach over the whole food supply chain.

Part 1: Introduction

A What is Organic Farming?

Organic farming is the most productive way to low-input agriculture^[1]. It is competitive in delivering public goods and services^[2] and it aims at food quality standards that are in line with the expectations of the majority of European consumers. Organic farming and organic food processing are **innovative systems** with regard to efficient and sustainable land use, food production and food marketing. They create **new practices** that the entire agro food business benefits from. Indeed, the European Commission^[3] recognises organic farming as an important way towards attaining the CAP reform objective of promoting environmentally friendly quality products.

Unlike other low-input methods of food production and processing, organic farming is highly standardised, at national, EU^[4] and international levels. In consequence, organic food has become a tradable commodity, a fact which is crucial to addressing in a pragmatic way the ecological and socio-economic problems of the European food system.

Organic farming is based on:

- Ecological principles (promotion of soil fertility, soil conservation, locally adapted production methods, closed nutrient cycles and an efficient use of local resources, minimised external inputs, diversity of species, crops and landscapes).
- Ethical and social principles (animal welfare, sustainability, risk prevention, rural development, self-reliance, fair trade, healthy nutrition).

Through these ecological, ethical and social standards, the organic food processing system enhances, all over the world, capital-extensive but labour-intensive production systems that contribute to the stabilisation of rural societies and allow equitable exchange of commodities and services with non-EU-countries.

B Economic importance of Organic Food and Farming

World-wide certified organic production is on 26.5 million hectares^[5], of which 24 % are in Europe, 5.5 % in North America, 23 % in South America, 50 % in Oceania and 4.5 % in Africa and Asia. Sales of organic food have gone up to 25 billion \$. Western Europe is the most important market for organic products, valued at 13 billion \$. With annual growth rates of 5-7%, this organic market represents an important perspective for European farmers' income. So far, in the EU, 3.4 % of the agricultural area is farmed organically.

^[1] Mäder P, Fließbach A, Dubois D, Gunst L, Fried P and Niggli U, 2002: Soil fertility and biodiversity in organic farming. *Science* 296: 1694-1697.

^[2] Hole D G, Perkins A J, Wilson J D, Alexander I H, Grice P V and Evans A D, 2005: Does organic farming benefit biodiversity? *Biological Conservation* 122, 113-130.

^[3] European Commission, 2004: European Action Plan for Organic Food and Farming.

^[4] For EU regulation see http://europa.eu.int/eur-lex/en/consleg/pdf/1991/en_1991R2092_do_001.pdf

^[5] Willer H and Yussefi M (Eds.), 2005: *The World of Organic Agriculture 2005 – Statistics and Emerging Trends*. 7th, revised edition, February 2005, International Federation of Organic Agriculture Movements (IFOAM), DE-Bonn, 170 pages, ISBN 3-934055-51-6.

C The policy framework of organic food and farming

On the 4th of June 2004, the European Commission adopted the 'European Action Plan for Organic Food and Farming' "in order to facilitate the expansion of the organic farming sector and also to increase its production capacity with new information and, above all, new technologies". The European Action Plan was the result of a continuous reform of the common agricultural policy aiming for environmentally responsible farmers, the viability of rural areas and the maintenance of agro-biodiversity.

Out of the 21 actions decided by the Commission in the European Action Plan for Organic Food and Farming, "strengthening training and research at all levels, from the adoption of research programmes in universities or other research bodies, to on-farm training to ensure suitable technology transfer to farmers" was one of the crucial policy instruments.

The Commission concluded that "the organic food and farming sector is very dynamic, showing rapid growth and constant development which need to be supported by both the development of novel technologies and the effective transfer of these to all stakeholders of the organic branch. (...) Therefore, training and research are relevant at all levels, from the adoption of research programmes in universities or other research bodies, to on-farm training to ensure suitable technology transfer to farmers." Among the Member States, the quantity, quality and institutional framework of research activities are very varied. In a few Member and Associate States, national programs for organic food and farming research have increased innovation during the last 10 years (Germany, Denmark, UK, France, Switzerland), in the majority of states, especially the new Member States, a severe backlog is perceived by the farmers and the sector.

Strengthening organic farming research would also take into account other EU policy strategies, such as halting the loss of biodiversity by 2010⁶, developing a medium and long-term EU strategy to combat climate change⁷, priorities set out in the Sixth Community Environment Action Programme, particularly those identified as thematic environmental strategies³ and the plan to develop an European Action Plan on Animal Welfare⁴. It also fits with the Lisbon strategy as, with organic agriculture, new work places are created especially in rural areas, making agriculture as a whole more efficient.

D Rationale for significant research support

Despite the fact that organic farming still represents a market niche, its integrative approach to solving the major problems of the European food system should be used by policy makers, stakeholders and the food industry in order to achieve ecological and societal objectives in a much broader sense. Unlike conventional agriculture and food systems, organic farming has not yet profited from massive efforts by either public research or sector-specific R&D. This is particularly relevant in the new EU member states, where growth of both production and consumption is highest at the moment and where many scientific and technical problems could be solved in shared research activities and exchange of knowledge.

⁶ In June 2004 EU Environment Ministers and March 2005 EU Heads of State reconfirmed their commitment to the 2010 target during European Council meetings, see:
[-http://www.countdown2010.net/documents/council_full.pdf](http://www.countdown2010.net/documents/council_full.pdf)
<http://www.countdown2010.net/documents/March%202005%20European%20Council%20conclusions.pdf>

⁷ **Presidency Conclusions - Brussels European Council, 22/23 March 2005**; COM(2004) 35: "Winning the Battle against Climate Change".

Furthermore, the multiplication effect of organic farming research, for the whole agricultural sector, is considerable, as it is the prototype for a sustainable food system and is highly efficient in producing both secure and high quality foods.

Conventional basic and applied agricultural research cannot cover all the research needs of the organic food and farming systems. On the one hand, specific components of this food system, which are not relevant for conventional or integrated agriculture, have to be developed from scratch, such as appropriate inputs or techniques for crops, feedstuff, livestock health and processed foods. On the other hand, many existing components and research results have to be integrated or redesigned for a much more complex production system where internal effects, networking among all components and organisms of the agro-ecosystem and prevention are the dominant steering mechanism. The need for interdisciplinary approaches and complex models is distinctive of this field of research.

E Conclusion

By continuing to strengthen R&D in organic agriculture in the 7th Framework of the EU and by allocating more funds to organic food systems, the European research area would keep its leadership and competitiveness in one of the rare innovative fields of agriculture and food, and would contribute to achieving several goals of different EU level policy strategies. This could be facilitated through a European Technology Platform for Organic Agriculture and the inclusion of specific relevant research topics in organic agriculture and food systems in several thematic areas in the new 7th Framework Programme.

The following listing of relevant research topics has been elaborated after broad consultation within IFOAM EU, which represents over 300 organisations in Europe. In Chapter 2.1, the most urgent high priority research topics, relevant for the whole organic food sector, are described in detail, indicating the rationale and the EU context. In chapter 3, other important research topics are listed, which for specific sectors of the organic food market (e.g. processors or retailers) or groups of countries (e.g. the new member states) have been identified as relevant).

Part 2: Main future research topics in organic agriculture and food systems.

A Societal Benefits, Agri-policy and Markets

Main topic 1: Organic / low-external-input farming and biodiversity

Low-input farming and especially organic farming provide for increased genetic and biotic diversity of agro-ecosystems. These effects derive basically from having less uniform site conditions, richer food chains (more micro-organisms and fauna in soils and on crops, more weeds), more attractive micro-and macro-habitats and fewer disturbances of living communities, because of e.g. pesticides constraints. Very specific targets of nature conservation, such as wildlife, birds, endangered weed communities, in-situ-maintenance of old crop genetics or diversified landscapes, can only be reached by much targeted measures, even in the framework of organic farms. Such objectives can only be successful in a co-operation between scientists and actors in both nature conservation and organic farming. In a case-study approach, using key indicators, the impact on biodiversity, of organic farming and other low-input agricultural methods, should be studied on different levels. Very targeted agricultural and ecological measures should be addressed as well, in order very precisely to reach the objectives of nature conservation. Recommendations to farmers should be developed.

Rationale and EU-context:

Biodiversity, wild-life and bird-life conservation, natural landscape design and maintenance of valuable crop diversity are all required by international agreements and are important objectives of the EU policy on rural development. As the scientific literature provides evidence of the positive impacts of organic farming in achieving these objectives, it obviously makes sense to explore this agricultural method for further ecological advantages and for the potential of different low-input farming systems to become a role model for ecological sensitive areas.

Main topic 2: Organic / low-external-input farming and climate change

The focus of this project should be on the impact of organic / low-input farming on greenhouse gas emissions. In particular, because of its lower intensity in organic livestock systems, its highly developed farmyard manure handling systems and its rejection of energy-demanding synthetic fertilisers, there is potential for reducing greenhouse gases. In addition, carbon sequestration should be investigated using existing long term comparison trials with arable rotations. In a case study approach, combined with modelling gas emissions of different farming systems, the link between cultivation-livestock systems and climate change should be highlighted and proposals for the further reduction of greenhouse gases should be made. Long term comparison trials, in different climate zones throughout Europe, should be used as a data source for the modelling.

Rationale and EU-context:

Agriculture is a major contributor to emissions of methane, nitrous oxide and carbon dioxide. On a global scale, agricultural land use in the 1990s has been responsible for approximately 15 % of all Greenhouse Gas (GHG) emissions. In future, mainstream agriculture will be moving towards increasing releases of GHG that will make agriculture even more a provoker of global warming rather than a mitigating factor. Organic farming, by contrast, has important options to offer both in lessening the production of atmospheric CO₂, CH₄ and N₂O and in systematically sequestering carbon dioxide in soils and in plant biomass. With the Clean Development Mechanism (CDM) under the Kyoto Protocol,

organic farming could become a strategy for participating in the joint Implementation Mechanism (e.g. in the co-operation between industrial and developing countries).

Main topic 3: Analysis of national implementation of CAP reform 2003 and rural development plans regarding the impact on organic farming

Organic Agriculture will be strongly affected by the new proposal for a Council Regulation on support for rural development, for the programming period 2007-2013, which was agreed in June 2005 by the European Commission and the European Council. The proposed axes and measures will offer a large menu of measures that could help in developing organic agriculture on a member state level as recommended in the Action Plan for Organic farming (measure 6). However, these axes are not sufficiently interlinked and not sufficiently clear as to how their implementation will impact on Organic farming. There is a need for scientific analysis of how further developed pillar 1 measures and the new Rural Development measures (pillar 2) will interact and have an impact on the development and competitiveness of Organic Agriculture. Model calculation with existing farm data as well as expert consultations can show the potential impact of such measures on farm level, regional and national level and show the effectiveness of the envisaged measures. Furthermore, in such a project, the different national implementation strategies relevant to organic agriculture will have to be analysed, including the analysis of bottom-up approaches in certain regions to strengthening Rural Development with the concept of Eco-Regions.

Rationale and EU context:

The new EU Rural Development Programme will be of high relevance for Organic agriculture, in particular for how this is implemented at national level and in regional contexts. Furthermore it is necessary to analyse the different implementation plans, their potential impacts and their link to national and regional Action plans for Organic agriculture.

Main topic 4: Organic farming and requirements of the Green Box (WTO)

Organic farming offers an excellent opportunity to combine multi-functionality with agricultural production. Literature studies show that organic farming can provide public goods and services to a greater extent than other farming systems. However, these have to be scientifically quantified and qualified under the extremely varied site and climate conditions throughout Europe. Emphasis should be given to different farm types (low-input, high-input organic farming, specialised units versus mixed farms etc.). The social benefits of different farming systems should be evaluated as well, including animal welfare aspects. External costs of non-organic agriculture should be taken into account. In order to allow for policy recommendations, the effectiveness and the efficiency of organic farming's systemic approach to contributing to a multifunctional EU agriculture should be assessed in-depth, against the background of the WTO requirements. This requires including a quantitative assessment of the externalities of organic and non-organic agriculture. An ecosystem service monitoring system, applied to various organic farming systems, should be developed.

Rationale and EU-context:

The European Commission recognises, in the published EU Action Plan for organic food and farming, the dual societal role of organic agriculture. Indeed, in this respect, provision of public goods and services and emerging market response to consumer concern are in full compliance with WTO requirements. However, policy makers do not yet perceive organic farming as a crucial instrument of the common agricultural policy. It is therefore important to explore organic farming's potential contribution to the Common Agricultural

Policy and thus the effectiveness and efficiency of organic farming as policy instrument in achieving the objectives of the Common Agricultural Policy under the framework of the WTO.

Main topic 5: Psychological and sociological barriers of consumers and market actors along the supply chain in dealing with organic food.

Several consumer studies confirm a positive attitude of consumers and traders towards buying organic food. However, the real consumption is much lower than could be expected from these surveys. Recent market tests indicate that consumers, when they have a choice between identical products at the same price, one labelled organic and the other not, significantly prefer the one not labelled, because of the prejudice against organic labels as being very expensive. Other studies indicate that consumers are more interested in single claims (like animal welfare, bird or wildlife conservation, fair trade, no additives in processing etc.) than in the holistic claim “organic”, although organic includes all these claims.

Barriers to the success of organic strategies can also be found within processing companies and big retailers. Contradictory opinions of decision makers in marketing, sales & purchase departments or in the matrix organisational structure of companies (category managers versus organic product manager) can lead to suboptimal or even unsuccessful marketing initiatives.

Some good examples show that organic food could be a very successful and economically interesting marketing strategy. Therefore, obstacles to a more widespread integration of organic food by conventional food retailers should be analysed in an integral way, addressing economic, sociological and psychological facts and attitudes. Experimental preference tests and qualitative survey techniques on the consumer side and surveys based on the ‘principal-agent-theory’ on the market actor side, would be adequate research methods in developing stringent recommendations for successful market initiatives.

Rationale and EU-context:

The EU Action Plan for Organic Farming intends to increase the organically managed land area within the EU. Such action plans have also recently been implemented at national level in most member states. As organic farming delivers spectacular societal benefits (ecological goods and services, safe and premium quality foods, ethical benefits like animal welfare etc.), it is crucial to overcome market constraints.

Main topic 6: Co-existence and organic farming

There is an ongoing discussion about the coexistence of organic farming and GM crops: Is this a serious threat or a tolerable option for European organic farming? What are the economic and other implications of co-existence for the entire organic sector? Risk analysis should be the basic approach to clarifying a number of problems in such a project, along the whole supply chain of selected commodities, specifically: the contamination risk for processed and unprocessed organic products, risks and opportunities for the breeding and seed industry, the effectiveness of preventive measures carried out by GMO “users” with respect to organic farming requirements, the liability issue and the economic risks for the organic farming sector (farmers, processors, retailers). Furthermore, research should be accompanied by social studies, getting insight into the social tensions between GMO and non-GMO farmers and regions.

Rationale and EU-context:

The Commission seems to be opting for a combined strategy: Using the innovative potential of Genetic Engineering for the European scientific community and for agriculture generally on the one hand, and ensuring premium food agriculture with a strong affinity to environment, nature conservation and biodiversity on the other hand. Such a segregation of agriculture would have a huge impact on how agriculture and food systems are organised, on rural development, on the whole input and processing industry and on legislation and subsidy policy. All these aspects can only be studied and influenced on a European level.

B Food Quality, Health and Food Technology

Main topic 7: Food quality – actual dietary behaviour – health – public health costs.

In almost all countries, public health costs are rising. The relation between actual dietary behaviour and public costs is often difficult to establish. Furthermore, it would be interesting to know what role high quality food, such as those from organic farming and low-input farming systems, combined with sustainable consumption modes, can play in reducing public health costs. There is still a concern that substances used in intensive agriculture and their combinations may have as yet unidentified negative effects on health, especially their possible roles in the increasing incidence of allergies, behavioural disorders and reproductive problems. It is therefore still urgently necessary to analyse interactions between different food or feed qualities and health parameters, using all possible approaches such as in vitro models, animal models (e.g. pigs) or dietary intervention studies and cohort epidemiological studies. A special focus should be on the impact of organic and conventional food diets on improving the human immune system. Interactions between eating patterns, food quality and obesity should also be addressed, because there is some evidence that especially tasty and authentic food can reduce obesity. And finally, there is a huge trend in food quality research to using complementary methods in order to gain additional information on food quality, such as picture-developing methods, bio-photons and electro-chemical methods. These methods should be evaluated in relation to analytical methods and in relation to possible health impacts. Recommendations for policy makers and market actors should be developed. In the project, an interdisciplinary focus will be crucial, involving medicine, economics, nutritional science and social sciences (especially psychology).

Rationale and EU-context:

Public health costs have been permanently rising; part of these excess costs being linked to shifting dietary behaviour, but some of them might also be caused by deteriorating quality of food due to considerable industrialisation of agricultural production methods. The latter effect can be both qualified and quantified by approaches comparing the impact of conventional and organic food on different model organisms, either cell culture, animal models or human populations. It is also very valuable to use organic food in such studies, because health claims are very common with this kind of food and because organic food is especially suited to communicating about health problems caused by inappropriate eating behaviour and industrialised food quality.

Main topic 8: Food processing technology for premium and organic foods, with a view to supporting innovation of SME.

Many consumers in Europe are very suspicious about the use of additives in food processing, especially for premium quality and organic foods. However, there are interesting innovative minimal processing methods being developed which allow giving up a number of additives by using innovative new technologies as well as by using the

functional properties of ingredients. These approaches should be explored and the acceptance by consumers should be investigated. Furthermore, processing methods should be developed which allow the reduction of the different impacts on food and the improvement of sensorial and nutritional quality parameters. Heat load indicators to monitor such more careful processing methods should be developed and tested. Recommendations on how such indicators and consumer-friendly technologies can be integrated into guidelines and standards should be developed. As many open questions need experimental research, innovative SME should be integrated in such projects, e.g. with the CRAFT programme. Other examples of research and development questions are: Concepts for improvement of the separation practice in parallel operations; Linking quality improvement with environmental orientation of processing and trading of organic products; development of certified organic ingredients with technological effects on food and positive effects on human health; improvement of the quality systems in order to improve integrity of organic foods, including new strategies for inspection and traceability; development of new labelling concepts for processing; development of suitable enzymes and starter cultures for organic food processing (excluding use of GMO's).

Rationale and EU-context:

Premium quality food is a fast-growing and important niche of the European food industry. This kind of food includes organic, 'slow' food and traditional food as well. All these foods are essential for the international competitiveness of the European industry and belong to the European cultural heritage. Innovative processing techniques, basically pursuing the idea of minimum destruction and maximum authenticity, are a cutting edge technology with a huge impact on both the food industry and the purchasing habits of consumers.

C Livestock production

Main topic 9: Improving animal health, product quality and performance of organic and low-external-input livestock systems through breeding

The focus of an integrated project should be on cattle, poultry and pigs. Different breeding concepts (molecular, holistic, participatory) should be analysed, regarding how fast, efficient, effective, animal-appropriate, ethical and safe they are in reaching the breeding aims especially needed for organic farming and low-input rearing. The main breeding aims of such systems are a good condition of health, well adapted to different or changing environments (good tolerance as well as fast recovery from environmental and management changes), high nutritional value and excellent sensory (organoleptic) quality of the products. Indicators should be developed which are tested in different breeding programmes in different macro-climatic regions.

In dairy breeding, genotype x environment interactions are of special interest. In a first stage, different types of cows (respectively different populations, simulating their own small breeding programs) are to be submitted to various conditions (extensive, low-input, organic, different restrictions in the use of biotechnologies in selection and reproduction). In a second stage, such breeding programs should be introduced into praxis in cooperation with breeding organisations. The need to find new measurable traits for health condition, tolerance of stress, grazing behaviour and roughage absorption should be addressed as well.

For laying hens and broilers, breeding strategies for extensive, low-input or organic management systems should be developed, in cooperation with breeding companies.

Rationale and EU-context:

The genetic potential of dairy cows (especially milk yield) cannot be exploited under low-input and organic production, as the feed diet is strictly roughage-based, is submitted to strong seasonal variation and has low nutrient concentration. The introduction of new techniques for selection (MAS, QTL) and for reproduction (oestrus synchronisation or induction, multiple ovulation induction and embryo transfer [MOET], in-vitro embryo production [IVP] and cloning by nuclear transfer [NT]) will increase the gap between the genetic potential of livestock and the site & environment specific performance. In many European regions, decentralised dairy production will remain desirable for tourism, rural development and landscape management. For such regions, low-input or organic dairy production, aiming at premium quality, will become increasingly important. Economically viable dairy production is possible if appropriate breeds are selected and genetic progress is also made under low-input and organic conditions. The objectives and the methods for such specific breeding programmes are global. They can best be addressed in a joint European project.

Main topic 10: Innovation in the field of alternative or complementary medication in organic livestock systems

Innovation in the field of alternative or complementary medication for organic livestock is still poor because potential markets are very small. There is a need to help SME to develop novel products, equipment, software and diagnostic tools, e.g. in combination with CRAFT projects. In addition, registration procedures in most EU countries represent a severe obstacle and are very inconsistent from country to country. Scientific and technical innovation should come from a joint effort of universities, independent research groups and specialised enterprises, supported by the EU. A range of novel veterinary treatments such as phytotherapy and homeopathy can be expected which will replace (or complement) synthetic allopathic medication in organic livestock systems. The project should gather necessary toxicological data through facilitating the preparation of the registration. The efficiency of the products should be tested in combination with optimising the preventive measures. Participatory on-farm research and specific extension & dissemination activities are essential.

Rationale and EU-context:

Allopathic medication will become increasingly obsolete because of the residues in meat, egg and dairy products and because of the negative impact on soil and water, via faeces and urine excretion. Alternative concepts are based on tolerant or resistant breeds and on prevention through herd management. Nevertheless, alternative medicines are needed in order to complement preventive measures. The costs of such innovative developments exceed the research funds of SME's and bigger companies are often not interested. As such veterinary drugs and techniques require appropriate registrations procedure; a Europe-wide approach is all the more justified in order to facilitate the market supply.

D Organic Crop Production**Main topic 11: Improving the quality, the ecological, technical and economic performance of organic and low-external-input crop production systems through breeding**

Comparison of different breeding concepts & approaches (molecular, holistic, participatory) regarding how fast, efficient, effective, environmentally friendly and safe they are, in reaching breeding aims, are especially needed for organic farming and low input agriculture. The main breeding aims of such systems should be a high nutritional

value, excellent sensory (organoleptic) quality, the stability (not the absolute amount) of yield, field tolerance to pests and diseases (in addition to or instead of mono- or multi-genetic resistance), the adaptation of N-demand of crops to the N-supply of organic soils in the context of different organic and low-input management practices, good competition on root, shoot and leaf levels and finally, crops better adapted to stressful environments and low input conditions. A case study approach with selected annual crops (a cereal, one or more vegetables) should be chosen and the consortium should consist of scientific institutes, participatory breeders and SME's.

Rationale and EU-context:

Advancements in breeding contribute considerably to the agronomical, economic and ecological performance of crop production. In the EU but also in other parts of the world, a segregation of crop production into premium quality, low-input and environmentally sound on the one hand and industrialised bulk production on the other hand, will become a reality. In terms of breeding aims, these two production strategies differ completely. Industrialised crop production can make best profit from novel breeding technologies deriving from private and public research; whilst low-input production systems suffer from a suboptimal seed supply. The existing but rare individual breeding initiatives show very promising results. Breeds and varieties for low-input agriculture could become an important niche for SME's. These breeding and seed producing companies are crucial for maintaining and utilizing a high diversity of crop genetics. As the markets for improved seed, suited to low-input agriculture and with an excellent capacity for regional variation, is on the verge of considerable growth, a joint research effort at EU level will enormously contribute to technical, economic and ecological innovation.

Part 3: Other relevant research topics for organic agriculture

CLUSTER A: SOCIO-ECONOMIC TOPICS

Topic A.1 Development of attitudes of different relevant societal groups and actors towards organic agriculture and consequences for future actions

The attitudes and aspirations towards organic agriculture have changed markedly in recent decades. There is no sociological study existing which compares this development. An analysis of the main actor groups such as farmers, researchers, traders and consumers in different European countries, would allow us to see the driving forces of this development and to draw conclusions about which institutional framework conditions are relevant and could be improved. An important issue is how the image of organic farmers in society has developed compared to that of conventional farmers. Knowledge of the attitudes of different groups in different phases and of the development of organic farming in different countries can help in future design of specific action plans for Organic Agriculture, in particular in accession countries.

Topic A.2 Combining “regionality”, food-origin and organic farming in European agriculture

In many European countries, some consumers associate organic farming with “regionality”. The local origin of food is an important buying motive. There are two issues to be explored: a) the ecological and economic impacts of short regional food chains (food miles, efficiency) and b) organic farming’s potential for contributing to rural development policy aims. Particularly, the linkage of “regionality” and organic farming has interesting potential to be explored. Besides creating more trust for the consumers, the stronger integration of regionality into Organic Agriculture has the potential to link rural development objectives with sustainability objectives, in particular in regions where the number of organic farmers is relatively high. The socio-economic benefits of integrative concepts of regionality and Organic Agriculture for rural development, e.g. with the “Bioregions” approach, where new partnerships between organic farmers, local processors, traders, gastronomy, tourism and local communities are built up, have to be analysed. The contribution of such initiatives to maintaining the rural population and to the regional economy has to be explored. The institutional framework for promoting such approaches has to be outlined.

Topic A.3 Socio-economic analysis of different forms of co-operation between farms

Financial constraints result in a specialisation of organic farming similar to that already observed in conventional agriculture, although slightly delayed. As a consequence, nutrient cycles are less closed, crop rotations are narrower and soil erosion and soil compaction might increase. Reduced diversity of crop and livestock leads to more problems with pests and diseases. It is very necessary to develop new forms of co-operation between farms in order to combine management, diversity and specialisation of production. Agronomical, ecological & economic advantages of and obstacles to different forms of co-operation should be analysed, as well as social and psychological aspects and restrictions on farm co-operation.

Topic A.4 Consolidated data on consumer behaviour with regard to organic food (European consumer panel)

Only in a few countries do consumer panels provide data about consumer behaviour with regard to organic food. However, due to the lack of international standards, these data are often not comparable. At European level, a data-base in the form of a European Consumer panel should be established, which would allow for comparing real consumer behaviour over several years and not only the attitudes in selected countries. Cooperation with specialised marketing firms might be necessary. Based on the analysis of these data, recommendations for market and policy actors can be made.

Topic A.5 Strategies of specialised retail shops for selling organic and regional special quality products, in a rural development perspective.

In recent years, the demand for organic food and for special quality products has risen constantly in most countries in Europe. One of the most important marketing channels for this growth, beside large retail chains, have in some countries been specialised shops such as Organic Food Shops (OSS), Natural Food Shops and direct marketers. From a rural development perspective, such specialised shops offer an important distribution channel particularly for regional products of small and medium-sized farmers and processors. Nevertheless, there are elementary deficits in knowledge, choice and transfer of marketing strategies for such shops, they being mainly SME's with limited budgets and often lacking in business and marketing skills. Marketing structures vary greatly in various European countries and therefore it is necessary to compare and transfer examples of Best Practice. In a European research project the factors of success and failure of different types of specialised shops can be analysed (e.g. with consumer and retailer surveys, SWOT and benchmark analysis) into types of shops in different cultural environments with a special emphasis on marketing strategies and impact on rural development. This would provide a basis for guidelines and recommendations for managers of OSSs, stakeholders, environmental bodies & policy makers.

Topic A.6 Development of procedures and tools for a more flexible implementation of the organic regulation 2092/91 in response to regional variation.

Agronomic conditions and farming practices vary widely within the EU. At present, the organic regulation 2092/91 and its annexes specify in great detail the allowed farming and food processing practices including the products allowed for use. The basic aims of the organic regulation are to ensure equal opportunities for producers and to build up consumer trust. As long as the principles of organic farming are respected, these aims are compatible with a more flexible implementation of the organic regulation, which allows to better handling regional variability. A more flexible implementation (i) allows to optimize organic farming practices at regional level, (ii) allows to better evaluate processing of regional food specialities, (iii) is more adequate for the specific conditions of developing countries and (iv) is in line with the goal of simplification of the organic regulation and with the trend for subsidiarity. Therefore, procedures, criteria and tools for a more flexible implementation of the organic regulation should be developed.

CLUSTER B: QUALITY, HEALTH AND FOOD SECURITY

Topic B.1 Enhancing health promoting properties of organic food and optimising its organoleptic quality parameters.

In the premium price food sector, the consumer expects the products to have an excellent taste, best intrinsic and extrinsic qualities and health benefits. An increasing number of

functional or designer foods are being introduced into this market sector and compete with organic produce. Other than functional foods, organic food gains its quality (both on the health and taste side) by interaction between management technique, soil properties, feed-stuff quality, climate, varieties, breeds and human knowledge. This approach to improving the taste of food and health promoting compounds in food is a very powerful but also a very demanding one. In the effort to produce a constantly high quality, not enough is known of the effect of individual factors and their combination on taste and quality. Research and dissemination of knowledge in this field should help to let organic food participate in the fast-growing market for premium and health foods.

Topic B.2 Reducing costs of different standard-setting and certification schemes for organic food.

Standard-setting and certification in organic farming and processing has become a considerable cost factor which makes the organic food industry less competitive. Slight differences in national and private standards and certification schemes impede fast trade in Europe. In particular for smallholder producers these high costs can be a barrier for conversion to organic farming. New problems, such as the potential coexistence between GMO and traditional crops, or residues of pesticides & other undesired compounds in organic foods, caused by environmental contamination or spray drift, will in future considerably increase the costs of organic food and its quality assurance system. In an EU-wide study, the costs and problems of standard-setting and certification should be analysed and recommendations should be given on how to reduce them considerably. More risk-oriented approaches should be compared with the actual inspection and certification systems and their cost-efficiency outlined. Alternatives schemes for group and participatory certification for smallholders will be investigated and its feasibility evaluated.

Topic B.3 Food security and organic food

An argument against organic farming often mentioned is that this farming method cannot feed the world. There should be a world-wide study, exploring the potential of and constraints on Organic Agriculture in ensuring sustainable food security. The study should focus not only on the yield but look also at other relevant parameters (Quality parameters, dry matter content, resource use, distribution problems, human diets in different countries, socio-economic framework conditions etc.). Cooperation with FAO is desirable.

CLUSTER C: ENVIRONMENT

Topic C.1 Organic & low-external-input farming and nutrient losses and recycling

An analysis should be made, in different organic and low-external-input farming systems, of the nutrient management and the potential for further reducing nutrient losses. A literature review should be done on nutrient budgeting in different farming systems and field studies done with regard to nitrogen losses. In a case study approach, ways of reducing nutrient losses should be analysed. It should include how to improve the recycling of nutrients from households back to the farms. Such an approach would contribute to the revitalisation of the countryside. The recommendations to be developed should be adapted to regional conditions.

CLUSTER D: RESEARCH TOPICS ADDRESSING LIVESTOCK PRODUCTION

Topic D.1 Improving husbandry systems which respect to animal welfare

Special attention should be given to reduce ammonia losses and greenhouse gases and to increase food safety (zoonoses etc.). Different low- and high input systems are compared in order to make optimum use of partially contradictory aims (animal welfare, environment, economy, food safety). Sustainable and ethologically sound strategies for free-range systems are to be developed and tested in a case study approach for beef, pigs and poultry. Special emphasis should be given to the feeding regime in order to have maximum synergies between outdoor feed intake and feed supplement.

Topic D.2 Comparing and optimising the immune system, the stress tolerance & stress recovery and problems with zoonoses under different environments and under different production systems

In organic and low-input rearing systems, the prevention of disease and parasites is the major step towards securing the health of livestock. The production system strongly influences the health status of livestock, both positively and negatively. Interactions between production system or method (e.g. intensity, housing, free range rhythm), the environment and the breeds should also occur. In an integrated project, strategies for optimising the health status should be developed which are tested in different case study regions with cattle, poultry, pigs and sheep or goats. Immune system, stress tolerance & stress recovery should be studied, as well as potential problems with major zoonoses and the microbial ecology of the organisms involved. Participatory on-farm research and specific extension and dissemination activities are essential.

Topic D.3 Sustainable organic dairy production, free of antibiotics

Mastitis still is the major health problem of cows in European organic dairy production. It causes severe economic losses by low yields and marketing restrictions because of residues of antibiotics. Organic milk produced under the USDA regulation is free of antibiotics mainly because dairy cows suffering from mastitis are removed and slaughtered. For a sustainable and cost-efficient dairy production, novel and holistic concepts of mastitis prevention and mastitis control have to be developed. Prevention strategies, optimising milking technology, feeding regime, housing and free range regime as well as the animal-farmer relationship, are one approach to follow; alternative medication and complementary therapies are another.

Topic D.4 The need for and alternatives to synthetic vitamins in organic animal husbandry

In EU Regulation 2092/91, the use of synthetic vitamins is restricted to non-ruminants and not allowed for ruminants. In a number of countries, farmers observe insufficient vitamin supply in cattle, sheep or goats. An analysis in different countries shall analyse if and under which conditions such problems occur and with which strategies these problems can be solved. Alternatives to the use of synthetic vitamins must be developed, for both ruminants and non-ruminants. Special emphasis should be given to reducing dependency on off-farm sources. Feeding experiments should be conducted with different regimes, preferably in an *on-farm* context. Dissemination activities to farmers, advisors and veterinarians are essential, as well as recommendations for the adaptation of the EU Regulation 2092/91.

CLUSTER E. RESEARCH TOPICS ADDRESSING ORGANIC PLANT PRODUCTION

Topic E.1 Soil health and link with plant health in organic and low-external-input farming systems

Research should look at the potential of good soil management, fertilisation strategies and cultivation systems (rotations, green-manures, use of high-quality compost, etc.) in reducing plant health problems, in particular with soil-born diseases in organic and low-external-input farming systems. Novel technologies for improving the health status of plants, e.g. with specific extracts of compost or soil with disease-suppressive abilities, should be investigated and tested in different climatic regions. Participatory *on-farm* research and specific extension & dissemination activities are essential.

Topic E.2 Supporting and facilitating innovation in the field of novel pesticides suited to organic farming.

Innovation in the field of pesticides for organic farming is still poor because the potential market (organic land area for different crops) is very small. There is a need to help SME's develop novel products, equipment, software and diagnostic tools, e.g. in combination with CRAFT projects. In addition, registration procedures in most EU countries represent a severe obstacle and are very inconsistent from country to country. Scientific and technical innovation has to come from a joint effort of universities, independent research groups and small bio-control enterprises, supported by the EU. A range of novel products and techniques can be expected, which will replace old pesticide practices in organic farming (copper, sulphur, nicotine, rotenone). Preventive management practices and the stabilizing effect of biodiversity (functional biodiversity) should be considered when developing and screening novel compounds and techniques.

Topic E.3 Prevention and control of pests and diseases in Mediterranean organic agriculture

Many organic farming methods, developed to prevent and control pest and diseases, work best under temperate climate conditions. Mediterranean production systems are completely different; in particular the pressure of pests and diseases is much higher. The concept of habitat management (functional biodiversity), the potential of intra-varietal diversity in crops and the complementary intervention by biological and mechanical techniques have to be studied and adapted. The Mediterranean region has an unique potential in providing high quality organic food Europe-wide, but will in future face strong competition from fast growing organic production in other regions with favourable growing conditions (Australia, India, China, South America). To maintain the competitiveness of European agriculture, special target oriented research projects have to develop better and innovative techniques and strategies for controlling the relevant pest and disease problems in the main crops. Participatory *on-farm* research and specific extension & dissemination activities are essential.