

# Priority topics for Horizon 2020 Work Programme 2016/2017

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## Introduction

**This paper describes the priority topics of TP Organics for the Work Programme 2016/2017 of Horizon 2020. They are based on the advanced drafts of the Strategic Research and Innovation Agenda of TP Organics which will be published at the end of 2014. The topic descriptions are the result of a process of one year and a half with experts and stakeholders, including an on-line consultation with more than 300 responses.**

TP Organics is the European Technology Platform (ETP) for organic food & farming and low-input agriculture. The platform consists of stakeholders, including farmers, SMEs, consumers, civil society organisations and researchers. It identifies research and innovation goals that leverage the organic sector's contribution to a healthy planet and sustainable food production. TP Organics considers the organic sector as a "living workshop" of innovations guiding the way towards Sustainable Food Security and empowerment of rural communities in Europe.

In March 2014, the European Commission published an ambitious [legislative proposal](#) for a new organic regulation. The proposal foresees the phasing out of several derogations in the near future, obliging organic farmers for example to only use organic seeds and locally grown organic feed. Whilst this move may be justified from a principled position, it can be difficult to implement in practice. The new regulation should therefore be accompanied with the necessary support instruments allowing the organic sector to adapt to the new rules and live up to the highest sustainability expectations. TP Organics therefore welcomes the Commission's [Organic Action Plan](#) published along with the legislative proposal, which extensively deals with the research and innovation needs of the organic sector. TP Organics calls for an ambitious implementation of the Organic Action Plan which should be reflected in an ambitious Horizon 2020 budget of € 380 million for the organic sector or 10% of the budget of Societal Challenge 2. This demand is in line with the conclusions of the EU Commission Conference "Organic and Low-input Agriculture: Implementing Innovation to respond to EU challenges" of 2012 which called for a research and innovation budget for organic farming that reflects its share of agricultural land. Currently, 5.6% of EU agricultural land is under organic management, whilst the potential is estimated at 15-20%.

Whilst all topics in this paper have a strong focus on the implementation of the Organic Action Plan, they also contribute to the challenges identified in the [report of the Advisory Group for Societal Challenge 2 of Horizon 2020](#) in particular to use resources more efficiently and with more knowledge input and to handle natural resources in synergies between intensified production, economic growth and preservation and renewal of natural capital in a circular economy. The topics have been clustered in two parts:

**Part A focuses on the contribution of the organic food & farming sector to Sustainable Food Security and resilient and resource-efficient agricultural value chains.**

Topic 1 "Alternatives to critical inputs used in organic agriculture" will contribute to the phasing out of inputs which are -although allowed by the EU organic regulation - not completely in line with the organic principles. The topic covers several of the challenges mentioned in the Organic Action Plan (p.7-8), e.g. the need for "innovative methods for management of pests, diseases and weeds", "alternatives to copper products for ecological plant protection", "reduction of energy consumption by greenhouses", "improved soil fertility" and "ingredients and techniques compatible with organic food processing". The development of alternatives for critical inputs in the organic sector will help to reduce input use in the conventional sector too and hence contribute to environment-smart primary production and healthy food production in general.

Topic 2 "**Availability of organic seeds – Towards 100% organic seed**" addresses the constraint of the availability of organic seed (Organic Action Plan, p.7). Better availability of organic seed will increase the economic resilience of the organic sector.

Topic 3 "**Eco-efficient production of animal feed at local level**" will help increase local production of organic feed crops and proteins. It addresses the constraints mentioned in the Organic Action Plan related to animal nutrition and protein supply (p. 7). More knowledge of local/regional production of animal feed will also make the conventional animal sector, now depending on overseas imports of protein feed, more environment and climate-smart and increase its resilience.

Topic 4 "**Organic food processing concepts and technologies**" addresses a long-standing demand of organic food processors for a Code of Practice providing decision criteria to select the most appropriate technologies for organic food processing. It addresses the need for "ingredients and techniques compatible with organic food processing" and "improved energy use" as identified by the Organic Action Plan (p.7-8). In a market where consumers increasingly ask for true quality and minimally processed food, the Code of Practice can contribute to the competitiveness of the European food industry as a whole. It will also help the food industry to improve its resource efficiency (e.g. water, energy use).

Topic 5 "**Public health effects of organic food systems in Europe**" addresses the lack of data on the relation between public health and organic food, both at the level of production and consumption. Promoting health is a central principle of organic agriculture. Activities will deliver knowledge for the discussion on the "safety of the food we eat and the environment in which we live" and aim at empowering citizens to change towards healthier and more sustainable lifestyles and consumption patterns.

**Part B focuses on fostering innovation, business opportunities and entrepreneurship in the organic sector and strengthening the contribution of the organic sector to a rural renaissance.**

Activities in topic 6 "**Innovative ICT tools for organic cropping systems**" will develop precision farming tools and machinery to make field operations in (organic) farming easier and less labour-intensive. Modern ICT tools can facilitate the management of multifunctional landscapes delivering a wide range of private and public goods.

Activities in topic 7 "**Internet-of-Things based solutions for resource efficient primary production**" will develop IoT-based sensors to collect data from primary production and link these with decision support systems helping farmers to increase resource efficiency. Particular attention should go to farm nutrient management and simulation tools for nitrogen mineralisation with which the organic sector has a long-standing expertise.

Topic 8 "**Supporting the development of a diverse organic sector**" covers several of the priorities outlined in the European Organic Action Plan:

- using the framework of the Rural Development Legislation to support organic farming (p. 5) and monitoring and evaluation of the Union's policy for organic production (p. 9) in scope **A. Developing the organic farming policies of the future**
- ensuring confidence in EU organic production (p.10) and promoting organic production through public procurement (p.7) in scope **B. Improving organic certification**
- reducing obstacles related to organic production (p. 7), gathering, analysing and disseminating data to increase the transparency of the organic market (p. 10) and reinforcing the external dimension (p.11) in scope **C. Better market and benchmarking data**

**to support the further development of the organic sector.** The use of big data analytics offers challenging opportunities here.

Activities in topic 8 will lead to sustainable employment in the organic sector. The organic sector has the potential to motivate and reunite actors all along the value chain in rural and urban areas and lead the way to a rural renaissance. Investment in organic farming will contribute to keeping rural areas as attractive places to live and work.

Topic 9 "**Agro-ecological and organic farming pathway to improve food security and rural development in Sub-Saharan Africa and South Asia**" contributes to the EU's Agricultural Research for Development policy. It looks at the conditions under which organic farming and agro-ecological practises can contribute to food security, economic development of rural communities and sustainable land use delivering a wide range of food, public goods and ecosystem services.

TP Organics is convinced that implementation of the proposed research & innovation projects through Horizon 2020 will highly contribute to the objectives of the EU's Organic Action Plan as well as leverage the organic sector's contribution to Sustainable Food Security and the renaissance of rural areas. Together, they will support sustainable growth of the organic sector in Europe and beyond. Complementary support from the Member States will however be needed. Therefore, TP Organics would like to end the introduction of this paper with highlighting the need for a **complementary, trans-national research programme, such as ERA-Net (co-fund)**, coordinating the research investment from funding bodies in the Member States, as also recommended by the Organic Action Plan (Action 7, p.9).

## **Part A:**

# **Contribution of organic sector to Sustainable Food Security and resilient and resource-efficient agricultural value chains**

## **Topic 1: Alternatives to critical inputs used in organic agriculture**

### **Specific challenge**

In the last 20 years, the organic sector has continuously grown in the EU. Increasing practical knowledge together with scientific research has allowed improving significantly the quantity, quality and diversity of organic production. Specific improvements have allowed to abandon the use of inputs not completely in line with the organic principles. Nevertheless there are still some inputs, allowed by the EU organic regulation, that are accepted only because so far there are no economically viable alternatives.

The most controversial is the use of copper as a plant protection product, but alternatives are also urgently needed for the use of mineral oils (as plant protection products), for manure from conventionally raised livestock, for certain vitamins used in animal production, for heating with fossil fuels in greenhouse production, and for the use of sulphites and nitrates in food processing.

### **Scope**

Projects should

- Assess actual need for the critical inputs as well as available alternatives (from science and practice) to critical inputs, both in terms of change in farm practice and use of other inputs
- Propose recommendations for the phasing out of critical inputs without damaging the competitiveness of the organic sector, whilst ensuring full respect for the organic principles
- Assess production, types and formulations of critical inputs and define criteria for their acceptability

Projects should contribute to fair, sustainable and implementable rules concerning the use of inputs in organic plant production, animal husbandry and processing. Activities should cover different geographic and climatic conditions, including in Associated Countries and non-European Mediterranean countries.

### **Expected impact**

- Fair, reliable and implementable rules on the use of inputs in organic production
- Improved assessment of the need and environmental impact of critical inputs
- Identification of alternatives to replace critical inputs. Better knowledge of alternatives will also allow reducing input use in conventional agriculture.
- Enhanced organic production quality and stability

## **Topic 2: Availability of organic seeds – Towards 100% organic seed**

### **Specific challenge**

The EU organic regulation requires that seed and propagation materials used in organic farming are organically produced. The rule has been in force since 1991 but several bottlenecks make it very difficult to comply with it. Therefore a derogation regime has been established which varies between Member States. This causes unfair competition and makes seed producers hesitant to make investments in organic seed production. However, ending the derogation regime would lead to the paradox that the diversity of varieties that organic farmers can use would decrease, with a negative impact on the sustainability and productivity of organic farming.

The organic movement is willing to take further steps in moving to 100% use of organic seeds. But for this to happen, sufficient supply of organic seed is needed from a broad range of crop types and varieties with different characteristics that fit to organic systems in different ecological and climatic zones and to different markets and market segments. The challenge is how to develop a stepwise approach towards 100% and diverse organic seed use and a level playing field for all stakeholders involved (farmers, processors, traders, retailers, seed producers, food trade chains, etc). This will require cooperation both on national and EU level.

### **Scope**

Projects should contribute to fair and sustainable rules regarding the use of organic seed. This can be achieved through:

- Survey of the availability of organic seed in different Member States and of the constraints to its increase
- Development of an EU-wide database which harmonises the registration of seeds, but takes account of regional specificities, and acknowledges that some seed is available in some regions only
- Development of a strategy to increase the production of organic seed, both by seed companies and on-farm
- Launch of variety trials in different Member States to evaluate potentially valuable varieties
- Critical review of the feasibility of achieving 100% use of organic seeds for all species grown in organic agriculture
- Identification of remaining gaps and launch of long-term breeding programs for organic farming
- Information, exchange and training modules to make farmers and growers aware of the importance of the use of organic seed and to involve them actively in the development of the organic seed sector, thereby taking their needs into account

### **Expected impact**

- Feasible pathways to achieve 100% use of organic seed
- Collection and exchange of practical, regulatory and scientific knowledge to achieve an extensive seed assortment in organic farming
- Efficient multiplication methods and farmers-breeders networks for the production of organic seed and genetic material adapted to organic systems
- Enhanced organic production quality and stability

### **Topic 3: Eco-efficient production of animal feed at local level**

#### **Specific challenge**

To close nutrient cycles is a key objective of organic farming. Nevertheless recycling of nutrients (within the farm or at regional level) is difficult to implement in large parts of the EU, mainly for economic reasons. Feed and livestock production are to large extent concentrated in different regions and animal feed (especially proteins) has to be imported from regions far away from where the animals are raised. This puts at risk the sustainability of organic production as well as consumers trust.

In order to help organic livestock producers to significantly increase the percentages of feed that come from the same region, enhanced efforts are needed to increase local production of feed crops and proteins. More knowledge on how to increase local production of protein crops will also make the conventional animal sector, now depending on overseas imports of protein feed, more environment- and climate-smart and increase its resilience.

Feed crops for all livestock species should be considered, but special attention should be paid to proteins for organic poultry and piglets, because these sectors still depend (up to 5%) on conventional protein feed.

#### **Scope**

Projects should:

- Gather experiences and practical knowledge on innovative systems of feed production developed locally or regionally
- Develop innovative cropping systems (locally adapted) for the production of local/regional feed. These would include growing new crops and more adapted varieties of existing crops, re-design of crop rotations and intercropping.
- Develop innovative processing methods, including bio-refinery, to convert crops and grassland forage into feed, to be implemented at farm level or in local co-operations
- Further explore the use of alternative protein sources for organic livestock
- Disseminate the collected knowledge through a participatory process

#### **Expected impact**

- Recommendations for fair implementation of the organic regulation concerning production and use of organic feed
- Improved sustainability of organic as well as conventional animal husbandry
- Development of new cropping systems for feed production and innovative use of crops, grassland forage, by-products and other potential protein sources, to be applied in the organic as well as conventional sector
- Support to local farming systems and economies driven by organic animal production



## **Topic 4: Organic food processing concepts and technologies**

### **Specific challenge**

Most of consumed food, even if organic, is processed. Organic consumers expect processing technologies that secure the high quality of organic food and have low environmental impact. However, up to now, specific processing technologies for organic food products have not been developed and there is no clear guidance on how to select the most appropriate technologies. Organic food processors have therefore expressed the need for a Code of Practise in which the rules and principles are translated into practise.

### **Scope**

A Code of Practise needs to be developed that provides decision criteria for operators to select the most appropriate technologies for the different steps of organic processing. Existing and novel processing techniques should be evaluated along critical control points. A standardised strategy for evaluation of processing technologies according to the organic principles should be developed. The Code should be focused on the most relevant product groups and developed in a participatory process with the organic industry, consumers and other stakeholders. The Code of Practise will also serve as a support document for the certification process.

### **Expected impact**

- Validated criteria for selecting organic processing technologies
- Identification of technologies complying with the organic principles
- Improved quality of processed organic products
- Increased competitiveness of organic food processing companies
- Increased consumer confidence in the organic sector

## **Topic 5: Public health effects of organic food systems in Europe**

### **Specific Challenge**

Evidence indicates significant links between agricultural methods, food quality and public health. Promoting health at various levels from individuals to communities is therefore considered a central principle of organic agriculture. Organic agriculture aims to produce high quality, nutritious food that contributes to preventive health care and well-being. In some cases organic farming is integrated with education and therapy objectives. Strategic investment in organic farming would therefore have a major impact on public health. However, to date there is extremely little research looking into the relation between public health and organic food production and consumption.

### **Scope**

The relation between public health and organic food production and consumption needs to be addressed by a systematic collection of scientific work and a comprehensive review of the current state of knowledge. This relation should be investigated in different settings, i.e. education, workplace, hospitals, tourism and other leisure settings. Health impacts on people working in the organic food chain should be investigated, including exposure to agricultural inputs and products used in food processing. Also the relation between lifestyle choices and "organic diets" needs to be researched. In this respect, the role of social and organic community networks needs to be considered.



A number of organic farms provide opportunities for so-called care farming which undertakes a role in rehabilitation and social reintegration of a wide range of people with medical and/or social needs. The contribution of the organic sector to this area needs to be analysed. The social, clinical and economic performance of care farming should be assessed with respect to different policy support systems. Successful systems of care farming need to be identified and knowledge transfer between European countries and between different target groups should be promoted.

**Expected Impact**

Data and evidence to support smart investments in organic agriculture for promoting public health in a more integrated and systemic way.

## **Part B:**

### **Fostering innovation in the organic sector and strengthening the contribution of the organic sector to a rural renaissance**

#### **Topic 6: Innovative ICT tools for organic cropping systems**

##### **Specific challenge:**

Organic agriculture is labour-intensive, especially so because pest and weed control is based on physical methods and only few types of machinery are adapted to the small-scale and diverse fields typical of organic agriculture. Modern ICT tools can be used to monitor field operations easier and could help increasing the quantity and quality of organic crop production and secure growth opportunities for organic farming.

##### **Scope**

##### **A. ICT tools and machinery for management of weeds, diseases and pests**

Projects should aim at developing ICT tools for monitoring and various types of machinery for control of weeds, diseases and pests compatible with organic farming. This could be done by developing systems that can differentiate crops from weeds, making possible automated, selective mechanical weeding, by developing new technologies for alternative methods of physical pest control, and by better monitoring and forecasting of pest and disease outbreaks. Development of such technology could facilitate adoption of physical weed and pest control methods in conventional farming too.

The project should follow a multi-actor approach. Adequate involvement of the farming sector and regional research stations and advisory services is requested. Activities should cover also Associated Countries and non-European Mediterranean countries.

##### **B. Selective harvesting and sorting tools for intercropping systems**

Intercropping systems can achieve higher production efficiency, product quality and yield stability. However, lack of machinery adapted to these systems hampers their economic competitiveness. Selective harvesting and sorting tools able to distinguish between the different crops need therefore be developed. Development of such machinery could facilitate adoption of intercropping in conventional farming too.

The project should follow a multi-actor approach. Adequate involvement of the farming sector and regional research stations and advisory services is requested. Activities should cover also Associated Countries and non-European Mediterranean countries.

##### **Expected impact**

- Increased resource efficiency and productivity in organic farming
- More efficient and feasible weed control techniques, both for organic and conventional farming
- New tools and machinery for physical pest control, both for organic and conventional farming
- Reduced farm production costs because of reduced manual weeding
- Increased product quality, especially of high value crops due to the use of selective harvesting and sorting machinery

- Increased knowledge exchange on ICT tools between interdisciplinary research institutions, end-users, and manufacturers

## **Topic 7: Internet-of-Things based solutions for resource efficient primary production**

### **Specific challenge**

The agriculture sector is undergoing a growing pressure on quality, security, reliability and resource-efficiency. ICT is increasingly applied to make several industries more resource efficient, while improving quality monitoring, traceability and consumer awareness. In the agricultural industry, the use of ICT is mostly related to machinery, processing and distribution systems with limited applications for on-field activities. In order to increase resource and process efficiency of primary production, a better monitoring of production (resource use, crop development, animal behaviour), as well as a better understanding of the specific farming conditions (e.g. weather and environmental conditions, emergence of pests, weeds and diseases) is needed. Data provided by a multitude of sources in different formats should be connected in the Internet of Things. They should be used to develop agronomic models, simulation tools, automated processes and predictive decision support systems for farmers. The organic sector can contribute with long-standing expertise with models for farm nutrient management and nitrogen mineralisation.

### **Scope**

Projects should develop smart, affordable, open source IoT-based solutions able to:

- Collect time and geo-referenced data retrieved from a multitude of diverse sensors in agricultural fields (in soil, water, air) and animal farms. Sensors need to be energy-autonomous and networked, and be able to operate in partially harsh environments
- Create a platform to integrate field-based data with 3<sup>rd</sup> party data such as historical and forecasted meteorological data, soil databases, soil, water and air analyses and databases of weeds, diseases and pests
- Analyse and merge heterogeneous sensor data and feed the processed information into state-of-the-art agronomic and economic models for decision support systems
- Derive best practices from the collected data and make them available on a platform
- Based on best practices, design automated processes to monitor and increase resource efficiency and to develop simulation tools to use the decision support systems in a predictive manner
- Apply and foster advances in autonomous driving for plant monitoring and harvesting
- Support data exchange with existing platforms (public or commercial platforms), stimulate knowledge exchange, interaction between farmers, advisors and researchers, and maximize adoption of solutions and best practices
- Provide data from primary production to track record from farm to fork

Projects should comply with potential ethical/regulatory issues, notably related to autonomous processes, and pay attention to governance issues like the ownership of data, privacy and liability aspects. They should provide business models for the exploitation of the IoT-based solutions.

### **Expected impact**

- Internet-of-Things based tools for increased resource efficiency in primary production
- Complex data of agronomic models translated into simple and action-oriented information

for farmers

- Widespread development and diffusion of predictive decision support systems in agriculture, with particular attention to nutrient management models
- Reduction of barriers to use decision support systems and IoT-based solutions
- Development of 3<sup>rd</sup> party applications based on collected data;
- Reduced time-to-market of innovative IoT-based solutions in agricultural sector
- More resource efficient agricultural production. Improved quality and stability of yields
- Reduced nutrient discharges from agricultural fields

## **Topic 8: Supporting the development of a diverse organic sector**

### **Specific challenge:**

Organic farming contributes to a number of policy goals such as high-quality food production as well as production of other goods and services, such as eco-systems services. However, the sector is challenged by greater demand than supply for several products. The number of new entrants has declined, small farmers are deterred by the cost for certification and there is a lack of reliable data on the organic market. Filling these gaps will enable producers and other businesses to make use of the opportunities the sector offers. There is a need to better understand the obstacles for the sector and potential synergies between different policy instruments to develop coherent and well-targeted support programmes.

### **Scope:**

Obstacles to farm organically arise from a variety of reasons, such as technical issues and access to know-how, access to markets and/or organic premiums, costs of organic inputs and certification, policy support, access to land, perceived higher labour requirements with potentially negative impacts on competitiveness and a variety of social issues. This can be addressed with a variety of support instruments. Projects should address one of the following issues:

#### **A. Developing the organic farming policies of the future**

A comprehensive and systemic framework for the analysis of interactions along the whole supply chain and in specific regions will provide recommendations for developing targeted support for the development of the sector. Projects should address the complex interactions and dependencies between different policy support instruments under different organic sector development trajectories, farm types and regional conditions. Projects should consider obstacles and support for organic farms under the Common Agricultural Policy (CAP) and reasons for leaving the organic sector, as well how to increase the use of organic products in public procurement. There also is a need for improving the monitoring of the effectiveness and efficiency of organic farming support policies, and for developing and testing distinct policy mixes. Monitoring should make use of existing data sources and tools as well as develop new approaches to evaluate the outputs, results and impacts of organic farming policy support. Particular attention should be paid to increasing the attractiveness of organic farming for small farms, for young entrants and for SMEs in the food manufacturing sector.

A multi-actor and multi-dimensional approach considering the views of farmers as well their suppliers, food manufacturers, distributors and policy makers should be adopted.

## **B. Improving organic certification**

Projects will develop proposals for group certification in Europe which should reduce the cost of certification in particular for small operators. Projects should also explore other alternatives how the third-party certification process can safeguard improvements towards the aspirational principles and objectives of organic farming (in relation to sustainability, environmental impact, and animal welfare) by operators along the whole supply chain. Risk-based approaches to certification, international developments in sustainability assessment for food and agriculture and recognition of organic certification Public Procurement criteria for food and catering services should be considered.

A multi-actor approach with the involvement of (groups of) farmers, supply chain actors and certification bodies in pilot projects is essential. The experience of other quality label programmes and existing tools should be utilised.

## **C. Better market and benchmarking data to support the further development of the organic sector**

Uncertainty regarding organic markets and prices, as well as financial performance and resource requirements of organic farming is a major impediment for new entrants along the supply-chain in making the decision to step into the organic sector. Data of good quality are needed to inform effective and rapid decisions both at governmental (policy-making) and enterprise or farm level.

There is a need to collect, analyse and disseminate data on production volume and value of key products, data on the domestic markets, exports and imports, and prices at farm and retail level. Statistical information should be expanded for the whole EU, the associated countries, the EFTA countries and selected third countries. Big Data and marketing analytics offer challenging opportunities to improve statistical analysis of market data, to enhance and harmonize data quality and develop an integrated platform for mutual sharing of large volumes of statistical information.

There is also a challenge to better understand how value is produced at farm level and along supply chains (including direct sales). Critical questions like economies of scale, benefits of specialisation vs. diversification, effects of knowledge and skills required, changes in labour requirements, work satisfaction and social and gender dynamics should be analysed. Decision support tools and planning data for different farm types, management strategies, geographic areas and site conditions should be developed. These tools should be integrated with data mining and other marketing analytics able to provide specific business intelligence for the development of selected organic supply-chains. The development of such tools could serve similar needs in conventional farming.

A multi-actor approach with close collaboration between farmers, consultants, supply chain actors (SMEs), public and private bodies publishing organic market data and researchers should be adopted. Activities should build on the outcomes of “Organic Data Network”, funded by the European Commission under FP7, and cover also Associated Countries and non-European Mediterranean countries, as well as selected International Co-operation Partner Countries (ICPC) from Asia and Latin America.

### **Expected impact**

- Transparency and confidence in opportunities offered by the organic sector is increased and strategies to overcome existing constraints are developed
- Effective targeted and multi-objective policy instruments and policy mixes for organic farming support that contribute to both sector development and to the delivery of public goods
- Credibility of the organic food and farming sector is strengthened and contribution of organic farming to sustainable rural development throughout Europe is enhanced

- Consumer trust in organic certification is improved whilst cost of certification is reduced
- Market transparency of the organic market is improved
- Greater clarity on business opportunities in the organic sector
- Better understanding of the labour dynamics resulting in improved competitiveness of organic businesses
- The use of organic products in public procurement is increased.

## **Topic 9: Agro-ecological and organic farming pathway to improve food security and rural development**

### **Specific challenge**

While today's global food production is sufficient to cover nutritional needs of the global population, food insecurity remains a problem, mainly in the rural areas of Sub-Saharan Africa and South Asia. There is growing evidence that the adaptation of agro-ecological principles and training in agro-ecological and organic farming methods will result in increased productivity, greater stability of yields, increased crop diversity and soil fertility through use of locally available resources. However, the contribution of such approaches to food security is frequently questioned because of the lower productivity of certain crops under high input conditions of Europe and the scarcity of robust evidence from other continents.

### **Scope**

The research will investigate under which conditions organic farming and agro-ecological approaches and practices are a pathway to food security in all its dimensions. It will integrate agronomical, biological, sociological and economic aspects through a combination of studies in case areas. The possibilities for generalisation and up-scaling of the results will be tested. The research will address the impact of different food chain development models (with links to markets through certification or without) on food security and rural development at the local and the national level. Furthermore, the research should investigate the potential benefits and drawbacks from organic agriculture and similar methods in terms of adaptation to and mitigation of climate change and its impact on future availability of water and eco-system services from soil fertility and biodiversity.

A multi-actor approach with a balanced partnership between participants from the EU and developing countries (minimum three International Cooperation Partner Countries of which two from Sub-Saharan Africa) and inclusion of relevant development organisations and stakeholders should be achieved.

### **Expected impact**

- Improved knowledge of the potential and limitations of organic agriculture and agro-ecology as a pathway to improved food security and market integration
- European consumers can make informed choices about imported organic products
- Exchange of knowledge and good practice in organic agriculture and agro-ecology with long-term benefits to smallholder farmers