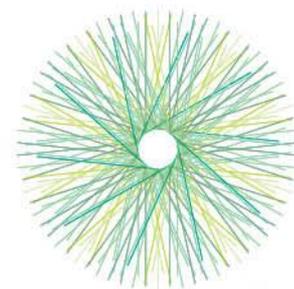


# Focus Group - Organic Farming

Optimising Arable Yields

**Recommendations and Outputs**



eip-agri

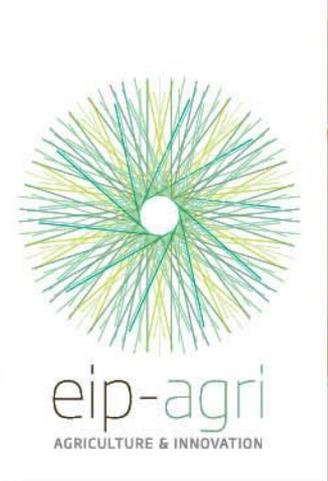
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# Focus Group - Organic Farming

## Optimising Arable Yields

### Recommendations and Outputs

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## Executive Summary

This report is the result of the Focus Group (FG) on Organic Farming, Optimising Arable Yields which was launched under the European Innovation Partnership (EIP-AGRI) 'Agricultural Productivity and Sustainability'. The Focus Group brought together 20 experts with different backgrounds and experiences (scientists, farmers, advisers...) to make recommendations on transferable innovative solutions on the topic of "optimising arable crop yields and eco-system services in organic systems (i.e. optimising organic arable farm performance, where performance stands for production, its quality and ecosystem services)". The Focus Group identified the main causes of the yield gap (the gap between the highest and lowest yielding organic producers and the gap between some conventional and organic crops) in 1) Poor soil fertility management; 2) Inadequate nutrient supply; 3) Insufficient weed management; 4) Pest and disease pressure and 5) Variety choice.

Besides these five specific topics, four horizontal themes were highlighted: the need for a systems approach; the need to enhance knowledge sharing; the development of resilient systems; and the need for a broad cultural shift.

The group produced a cluster of proposals to contribute to the practical solutions of the problem:

1. a coherent collection of proposals for action, including proposals for topics for Operational Groups (OG)
2. a list of practical solutions which have already been implemented and can serve as examples;
3. concrete suggestions for the setting-up of Operational Groups in terms of methodology and practical elements;
4. recommendations for future research topics and methodologies;
5. proposals for dissemination, training and education programmes.

**1. Main topics suggested for Operational Groups** relate to:

- farming systems co-design;
- information and decision support systems;
- how to increase soil microbial activity and biodiversity by farming techniques;
- fine-tuning of composting techniques;
- nutrient release of organic fertilisers;
- fine-tuning of new machines;
- organising joint purchase and use of machinery;
- selecting locally appropriate robust varieties;
- developing innovative tillage techniques;
- fostering the use of companion planting and cover crops;
- introducing new crops and variety trials;
- developing new fertilisers appropriate to the organic concept.

**2. For the examples of practical solutions** the Focus Group collected 25 examples of existing groups of farmers, researchers, advisers and other actors that in different forms have developed innovation together. Out of the 25 cases presented, the group selected five as the most inspiring based on their orientation towards practical problem-solving, the degree of interactivity in the projects as well as the capacity to broaden them and their potential for future further implementation and follow-up in different areas.

**3. A simulation exercise highlighted some recommendations for the setting-up of Operational Groups:** a) there is no one way to implement Operational Group activity but a high degree of adaptation not only to the agronomic context, but also to the social and the environmental context is needed; b) the role of facilitators is highly relevant; c) it is important to give rapid answers to farmers; d) it is essential to carry out an economic assessment of the proposed innovations; e) long-term planning is important.

**4. The recommendations for research topics** include several aspects mentioned as topics for the Operational Groups but also some specific issues such as the analysis of low phosphorus (P) and potassium (K) systems to understand how they function; the identification of new sources of organic fertilisers; the analysis of the contribution of organic management practices on carbon sequestration, water holding capacity and erosion reduction; the adaptation of conservation agriculture techniques to organic systems; the development of urban and peri-urban organic agriculture; the knowledge on the predation of weed seeds and on allelopathic effects; the development of improved inter-sowing and under-sowing systems; the development of more precise and easy-to-use forecasting tools; the development of highly diverse systems to prevent soil pathogens; the programming of delocalised and participatory breeding systems; the re-framing of breeding criteria.

**5. The proposals for training and educational programmes** include the suggestion to establish a network of knowledge centres and a network of commercial demonstration/showcasing farms, as well as some general recommendations on the methodology and some specific topics: the use of information and decision support systems, tillage optimisation, functional biodiversity and the use of innovative communication tools. The next step for the Focus Group is the dissemination of its results and recommendations through the EIP-AGRI network and by each Focus Group expert. All experts are willing to cooperate at local level by spreading the knowledge gained and also by supporting the setting-up of local Operational Groups under Rural Development programmes.

## 1. Introduction

### Setting out the framework for the Focus Group's work

The Focus Group (FG) on closing the organic yield gap was launched by the European Commission in 2013 as part of the activities carried out under the European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI). The specific topic was identified for its relevance by the EIP-AGRI High Level Steering Board and was further explained to the Focus Group as "How to identify the optimal production level of organic systems and how to reduce the yield gap that separates organic from conventional in some crops, and how to enhance the performance of low-yielding organic farms to the level of the best performers?".

The Focus Group on Organic Farming brought together 20 experts from the EU (see annex A) with the purpose to explore practical, innovative solutions and best practices to problems or opportunities in the field and give recommendations for interactive innovation projects that can be carried out by Operational Groups or other project formats. The group also discussed and documented research needs for further research activities that could help to solve the problems related to the organic yield gap.

During the first meeting, the experts decided to slightly reformulate the definition of the problem as "optimising arable crop yields and eco-system services in organic systems (i.e. optimising organic arable farm performance, where performance stands for production, its quality and ecosystem services)".

The European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) is one of five EIPs which have been launched by the European Commission in a bid to promote rapid modernisation of the sectors concerned by stepping up innovation efforts. The EIP-AGRI aims to catalyse the innovation process in the agricultural and forestry sectors by bringing research and practice closer together – in research and innovation projects as well as via the EIP-AGRI network.

EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI: the EU Research and Innovation framework, Horizon 2020, as well as the EU Rural Development Policy.

An EIP-AGRI Focus Group is one of the building blocks that aims at complementing the construction of the EIP-AGRI network, which is funded under the EU Rural Development policy. Working on a narrowly defined issue, Focus Groups temporarily bring together 20 experts (such as farmers, advisers, researchers, up and downstream businesses and NGOs) to map and develop solutions within their field.

The concrete objectives of a Focus Group are: to take stock of the state of art of practice and research in its field, listing problems and opportunities; to identify needs from practice and propose directions for further research; to propose priorities for innovative actions by suggesting potential projects for Operational Groups working under Rural Development or other project formats to test solutions and opportunities, including ways to disseminate the practical knowledge gathered. Results are normally published in a report within 12-18 months of the launch of a given Focus Group.

Experts are selected based on an open call for interest. Each expert is appointed based on his or her personal knowledge and experience in the particular field and does therefore not represent an organisation or a Member State.

This report presents the context and the results from this Focus Group. It includes information on the work process and its outcomes, with the goal to support the EIP implementation at different levels.

## 2. The EU organic sector

### 2.1 Surface and producers

Almost a quarter of the World's organic agricultural land is situated in the EU<sup>1</sup>. According to Eurostat data, in 2011 the EU-27 had a total area of 9.6 million hectares cultivated as organic, representing 5.4% of EU agricultural land<sup>2</sup>. In the EU, organic arable crops (cereals, pulses, open field vegetables etc.) are the main organic crop group in terms of cultivated surface<sup>3</sup>.

### 2.2 The European market of organic products

In the last decade, Europe became a major player in the organic sector. The organic farming share in European agriculture rose substantially, and at the same time European citizens started to increase their demand for organic products. In 2012, European sales of organic products were approximately 22.8 billion € with an increase of 6 per cent from 2011<sup>4</sup>. This includes organic products imported into the EU but does not consider a significant amount of European organic products exported outside the EU.

However, the European organic sector heavily depends on third countries for cereals, pulses and all products for feed production. The trends in market development suggest that even if the USA will remain the main market for organic products in global value terms, Europe will continue to increase the share of its organic market, with countries such as Switzerland and Denmark leading in terms of per-capita consumption of organic products.

### 2.3 Research to support organic agriculture development

The early development of organic farming was based only on pioneers' will and consumer demand. It lacked scientific support and technical knowledge, and the many valuable local experiences were only partially shared within the organic community. Few scientists were part of the early movement and the empiric approach was often the only option for practitioners to solve their problems. Since the late 1980s, several EU Member States such as Germany, France and United Kingdom, and also Switzerland launched national programmes for scientific and technical support. In the 90s, the first EU research projects on organic farming were financed and in 2006 the first ERA-Net joint call (involving 11 countries) was launched. Under the 5th EU framework programme for research, 11 organic farming projects were funded with a total EU support of 15.4 million €. The 6th framework programme funded nine organic farming projects with a total EU support 22.1 million € and the figures for the 7th framework programme were almost the same in<sup>5</sup>.

The effect of research on the development of the organic sector is complicated to measure, but the Danish International Centre for Research in Organic Food Systems tried to quantify the impact of 15 years of national research programmes on the size and profitability of the Danish organic sector. The study estimated that production would have been 10-15% lower without the research programmes, which received approximately 500 million DKK (about 67 million €) in the period 1996-2012<sup>6</sup>.

### 2.4 The issue of the yield gap

Two recently published meta-analyses contribute to the debate on the widely discussed issue of the "yield gap". The first meta-analysis<sup>7</sup> shows how organic yields on average give 80% of conventional

- 1 FIBL and IFOAM, 2014.
- 2 European Commission, October 2013.
- 3 IFOAM-EU, FIBL and CIHEAM-IAMB 2014.
- 4 <http://www.organic-world.net/>
- 5 Schmid O. et al., 2009.
- 6 ICROFS, 2013.
- 7 De Ponti et al. 2012.

yields, but it also shows the significant variations (standard deviation 21%) between regions, systems and also between real farm data compared to data from experimental trials. Looking at the details of the study, the yield gap between conventional and organic agriculture appears to widen when conventional systems reach their maximum potential, using external inputs, and under favourable conditions.

The second meta-analysis<sup>8</sup> shows an average 75% of organic productivity compared to conventional, but stresses the fact that good management practices, particular crop types and growing conditions, can bring organic systems to nearly the same yield as conventional.

The studies provoked a lively debate as they reflect practitioners' experiences. For instance the yield gap is larger for highly productive crops in areas with high production potentials and vocation: maize and soybean in Po Valley, wheat and sunflower in Central France, rape-seed and potatoes in Central Europe. On the contrary, in lower performing systems (extensive farming systems, developing countries, dry areas, low external input), the difference is limited or even counterbalanced by the fact that organic production can be more stable in the long term.

Moreover, the scientific literature assesses data from crop and field level while practitioners evaluate global farm performance in the longer run and the results may differ strongly. Scientists' and practitioners' experiences confirm the wide differences in yield (but also of environmental performance and global sustainability) that different organic farms may face depending on their management strategies.

To further complicate the assessment and the understanding between scientist and practitioner, a recent Danish analysis<sup>9</sup> confirms that there is also a "gap" between the scientific idea of robust and economically viable organic arable farming systems with optimised crop rotations for nutrient and pest management and what these systems look like in practice. The remarks are supported by an Italian study<sup>10</sup> showing that the analysis of very diverse Italian organic production systems revealed that all of them have ample margins of improvement in terms of sustainability.

This leads to the need for a common definition of "optimal production level" of organic systems. The assessment of yield per hectare of conventional crops is not appropriate to evaluate the yield of organic systems, often characterised by mixed cropping, livestock systems and other by-products and services. If high yields are to be achieved sustainably, this requires a thorough consideration of quality of the product, production costs and environmental services provided by the farming system along the whole crop rotation and not only on a single crop basis.

To close the yield gap, there are numerous elements of the farming system that must be considered and which differ depending on the region and the system. Nevertheless, nutrient management and soil fertility; weed, pest and disease management; availability of locally adapted genetic materials and the capacity to build systems with high functional biodiversity, all have a major impact on productivity and sustainability. All these elements have to be matched within the crop rotation and the economic sustainability of the farm. The concept of eco-functional intensification may help in the definition of "optimal yield" of organic systems: more efficient use of natural resources and processes, improved nutrient recycling techniques and innovative agroecological methods to enhance the diversity and the health of soils, crops and livestock<sup>11</sup>.

Another well-established concept to serve as a tool for the definition of "optimised yield" and for the identification of the elements influencing the farm performance is agroecology. A commonly accepted definition of agroecology is: a scientific discipline that uses ecological theory to study, design, manage and evaluate agricultural systems that are productive but also resource-conserving. Agroecology-

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8 Seufert V. et al., 2012.

9 Noe E et al. 2013.

10 Barberi P., 2013.

11 Schmid O. et al., 2009.

concerns the maintenance of a productive agriculture that sustains yields and optimises the use of local resources while minimising the negative environmental and socio-economic impacts of conventional technologies<sup>12</sup>.

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12 Wiblemann et al., 2013, [www.agroecology.org](http://www.agroecology.org)

## 3. Results and recommendations from the Focus Group

### 3.1 How to close the yield gap?

The Focus Group on Organic Farming proposed practical solutions to close the yield gap and allow all organic farmers to reach their best potential. In pursuing the task, the work was structured into two phases: a deep analysis of the causes behind the gap and the development of proposals to narrow or close it.

Both phases delivered valuable outcome that can be useful in structuring and implementing the EIP-AGRI at EU, National and Regional level.

#### 3.1.1 The analysis of the causes behind the yield gap

It is necessary to consider several elements of the farming system which differ widely depending on the region and the system. All the elements have to be matched within the crop rotation and the economic sustainability of the farm. It is not just about more tons per hectare, better economic results must be achieved sustainably and this requires a thorough consideration of the quality of the product, production costs and environmental services provided by the farming system at farm scale and along the whole value chain.

The Focus Group identified five main areas causing the yield gaps and ranked their relevance. The most important factor was identified as **1) Poor soil fertility management**, followed by and linked to **2) Inadequate nutrient supply**, while **3) Insufficient weed management**, **4) Pest and disease pressure** and **5) Variety choice** were attributed a lower importance for some regions in Europe, even if the availability of appropriate genetic materials (summarised in variety choice) was identified as relevant for the solution of many of the other impacting factors. The ranking of importance of different factors may vary between regions and systems, for example, the lack of biologically and economically effective weed management is one of the most important causes of yield gaps in northern Europe, while the main issues in the South are soil fertility and more resilient crops/varieties.

As well as these five specific topics, the Focus Group members also identified four horizontal themes that should be considered for the successful implementation of any solution. They are: the need of a **systems approach** in the assessment and improvement of existing systems but also in the development of new systems (such as innovative agro-forestry systems) and in elaborating area-specific innovation (i.e. a machine for weed control or a new fertiliser); the need to **enhance knowledge sharing** (not simply the dissemination of knowledge but a more circular co-production and sharing of knowledge) among all the actors involved; the relevance of building up **resilient systems** which are able to maintain their economic and agronomic sustainability through changes of climatic, social, environmental conditions; and the need for a broad **cultural shift along the whole value chain** and engaging all actors.

A first discussion paper summarised the starting point of the discussion and highlighted basic elements of each factor. The state of the art was completed and detailed with practical examples by the inclusion of suggestions and examples produced by the experts in the format of 'mini-papers'. They are short papers written by one or small groups of Focus Group experts on a specific topic identified during the first meeting as highly relevant for overcoming the yield gap. They include research outcomes but also practical experiences. All documents can be found on the EIP-AGRI website<sup>13</sup>.

#### 3.1.2 The proposals to close the yield gap

Based on the input from the mini papers, the Focus Group has made proposals in the following areas:

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13 [www.eip-agri.eu](http://www.eip-agri.eu) (operational May 2014), until then:  
[http://ec.europa.eu/agriculture/eip/focus-groups/organic-farming/index\\_en.htm](http://ec.europa.eu/agriculture/eip/focus-groups/organic-farming/index_en.htm)

- A coherent collection of proposals for action, including proposals for topics of Operational Groups.
- A list of practical solutions already implemented, to serve as examples.
- Concrete suggestions for setting up operational groups, in terms of methodology and practical elements.
- Recommendations for future research topics and methodologies and proposals for training and education programmes.

### 3.1.2 a) Proposals for action – topics for operational groups

Considering the scope of the Focus Group's topic, there is a common understanding amongst the experts that not a single action but a range of actions are needed to give appropriate answers. As a consequence, the experts developed clusters of proposals for action, being aware that even if acting on a specific practical problem, a systems approach was needed. This means contextualising and fitting each action to the whole system with the aim of optimising yield (meant, as defined before, as a combination of production quantity and quality and ecosystem services).

**Detailed descriptions of clusters of proposals for action (OG topics) are reported in the annex B and the main features are summarised below:**

**FARMING SYSTEMS- CO-DESIGN**, is a process of utmost importance that can be proposed at any geographic level and specifically contextualised and focussed on local needs and climatic, soil specific, social and farming peculiarities. In each local implementation some specific issues will turn out to be more relevant (i.e. weed management or nutrient availability or quality of obtained products etc.). However, the main concept remains valid wherever it is applied.

All main topic areas can be included, identifying their specific relevance to their contexts through the participatory process that has to involve all concerned actors.

The main aim is to increase total biomass production, and as a consequence the productivity of the system. This should be achieved through enhancing microbial soil activity and nutrient availability, decreasing weed pressure and increasing resilience towards climate change and any other changes affecting the system.

The range of actors involved includes farmers, advisers, local experimental stations, local authorities and businesses (processors, traders, transport agencies).

The Operational Groups should work on the potential of including new crops and new crops combinations in the crop rotation. Legumes play a relevant role in the rotation review, both for agronomic, environmental and economic purposes. Moreover, the design of innovative systems could include new forms of mixed-farming, where animals and plants are brought together at farm or regional level in the attempt to rebuild sustainable circular systems where organic matter, nutrients and energy flows between each element with reduced wastes and limited needs of external inputs. Furthermore, agro-forestry elements (wood areas in farmland, edges, trees rows etc.) should be tested and, where positively assessed, included in the innovative farm design.

The implementation of the newly designed systems should be supported by software tools (to guide rotation planning, fertilisation, weed and pest and diseases management) and monitored with appropriate assessment tools.

To facilitate the scaling-up or replication in different areas, implementation guidelines should be prepared and they should include relevant positive and negative experiences.

The activity of the Operational Groups should include specific case studies, on-farm demonstrations, pilot farm networking.

**INFORMATION AND DECISION SUPPORT SYSTEMS**. There are already a number of tools available on the market which allow to predict crop risks due to weeds or to pest and disease. Such

tools for or example as: tools that look at the attack risk and allow to guide the decision making process for the identification of the most appropriate and efficient pest and disease control interventions, or tools that allow to identify the most appropriate crop rotation plan and the best combination with the fertilisers to be used. Nevertheless, their use by practitioners is very limited in the arable crops sector (while for example they are commonly used in fruit and grape wine production systems). Operational Groups focussing on facilitating the practical use of these tools should identify which factors limit their use in the specific farmer and adviser community where the Operational Group is carrying out its activities. A higher user-friendliness of the tools is also an element to be considered. There is the need to demonstrate to farmers and advisers how these tools can benefit practical work and save resources, but also how they can be combined with farmers' craftsmanship (meaning the capacity to make by his/her own the tools or the materials needed on farm) and observation capacity to obtain the best results.

The actors to involve in the process are farmers, advisers, technology providers, researchers of different specialities but with the capacity to work in interdisciplinary teams.

Any kind of tool should be explored (apps, web-based tools, field devices...) with the scope to identify the most suitable for the specific group of farmers.

The success with a group of farmers will automatically open the possibility to scale-up, or better, to replicate the experience in other groups, since farmer-to-farmer exchange of experience can, in this specific topic, be the key.

**HOW TO INCREASE SOIL MICROBIAL ACTIVITY AND BIODIVERSITY BY FARMING TECHNIQUES.** This relates mainly to the soil fertility topic but it also influences all other domains. The main scope is to increase soil fertility and nutrient availability at low cost and limiting extra-farm inputs. N-fixing microbial activity including establishment of effective legume-*Rhizobium* symbiosis has a major role in the topic.

In research publications, some knowledge is already available (for example on the use of organic matter or the allelopathic effect of certain species or on the choice of tools for soil management that do not negatively affect soil life) but the activity in Operational Groups would allow to make use of available outcomes and to produce new site-specific knowledge for further use.

Actors to be involved are farmers, advisers, local experimental stations, public authorities, recycling industries and researchers.

The topic is of general importance but it has higher relevance in Mediterranean regions where organic matter content in the soil is critical. It is also relevant in stockless farming systems, in areas with high risk of leaching and specialised crops (i.e. horticulture).

The scaling up can be facilitated by farm days, demonstration activities, networking with similar Operational Groups in other regions.

**FINE-TUNING OF COMPOSTING TECHNIQUES.** Compost of different materials is strategic for soil fertility management and the increase of nutrient availability at limited costs while recycling waste from agriculture and food industries and other sources. Local Operational Groups can identify locally available sources of organic matter and use the available scientific knowledge as well as practical experiences to identify and implement the solutions best adapted to the local situation. The topic is generally relevant and most important in areas with degraded soils and on high-value specialised crops (i.e. vegetables).

The actors to be involved include farmers, researchers, advisers, waste managers, local decision makers, machinery producers, and public authorities.

**NUTRIENT RELEASE OF ORGANIC FERTILISERS.** In organic farming a large number of organic fertilisers, farm yard manures, organic, green manure, crop residues, waste products, of different qualities are used depending on e.g. site conditions, production system and fertiliser availability. Operational Groups could share knowledge on performance of organic fertilisers/manures and best management experiences including cultivation measures and tillage. They could also combine experiences with scientific knowledge of the correlation between fertiliser/manure quality and nutrient release for example. The timing of fertilisation is important for higher productivity, better resources use and lower nutrient losses to the environment.

The actors involved include farmers, advisers, researchers, local experimental stations, retailers of farming commodities, regional authorities.

**FINE-TUNING OF NEW MACHINES.** This can contribute to soil fertility management but also to weeds, pest and diseases management. Several new machines have recently been developed by the private sector (especially for highly precise weed management and for careful soil management) and by researchers but their use is still very limited due to limited knowledge and lack of skills on their use. Local Operational Groups can demonstrate the potentials and limits of each new machine under local conditions and fine-tune their use in the specific cropping systems. The machines can be equipped with precision tools and an economic assessment is needed for a fair comparison of alternatives.

The actors involved can be farmers, advisers, local experimental stations, machine builders.

**ORGANISING JOINT PURCHASE AND USE OF MACHINERY (machine rings).** Machine rings are an efficient way to make use of innovative and fine-tuned machines without big investments. They are particularly important for organic farmers as they use a larger range of machines for specific purposes and they generally grow more crops on the same farm which requires a wider range of tools. Often such machines and tools are very specific for organic farming. They are also expensive and require specific skills for appropriate and efficient use, which can only be acquired through practice. The machine ring can contribute to improving soil fertility management but also weed and pest and disease management. Machine rings are common in certain regions (i.e. Scotland, Austria, Germany, Sweden) but totally unused or unknown in other regions. In this case Operational Groups in areas not familiar with the organisation of machine rings can profit from an exchange with regions where it is common practice. This will be helpful in identifying their specific implementation path, legal and contractual arrangements and other steps in setting up a successful machine ring.

**SELECTING LOCALLY APPROPRIATE ROBUST VARIETIES.** The use of varieties (or more generally genetic materials) adapted to specific climatic, soil and farming systems conditions is strategic in organic farming as it can contribute to the prevention and solving of many problems. For instance, the choice of varieties with moderate/low nutrient demand which are competitive towards weeds, tolerant or resistant to pest and diseases and fit to a specific crop rotation and market demands.

Organic farming requires varieties combining different characteristics, for example competitiveness towards weeds with tolerance to dry climates and quality of the product, but breeders usually focus on only one specific characteristic, often tolerance to diseases. At EU and National levels, several research projects have developed methodologies and examples ([www.eco-pb.org](http://www.eco-pb.org); EU FP7 SOLIBAM- [www.solibam.eu](http://www.solibam.eu); ERA-net COBRA project- [www.coreorganic2.org](http://www.coreorganic2.org)) and several groups in Europe are already engaged on the topic, for example in France ([www.semencespaysannes.org](http://www.semencespaysannes.org)), The Netherlands, Austria ([www.saatzucht-donau.at](http://www.saatzucht-donau.at)) and Italy ([www.semirurali.net](http://www.semirurali.net)) Spain ([www.redsemillas.info](http://www.redsemillas.info)). Nevertheless, there is still a pressing need to run local processes and to expand the experience to all crops, especially leguminous crops. Currently, most breeding efforts focus on cereals and a few vegetables. The potential for the use of mixtures of varieties should also be explored. Operational Groups can take steps from existing knowledge and

develop local (regional or trans-regional) actions on developing or selecting locally appropriate robust varieties.

The actors to be involved are researchers, farmers, breeders, advisers and consumers.

More than a scaling-up process, it is preferable to have a multiplication of experiences and the tools to make it possible include a network of existing experiences, farm days and a set of guidelines.

**DEVELOPING INNOVATIVE TILLAGE TECHNIQUES.** This can contribute to building more resilient farming systems which are able to adapt to climate change and maintain good production levels while protecting soil fertility. It includes reduced tillage techniques that conserve soil carbon stocks and prevent weed infestation. The topic is of general relevance and the actors to be involved include farmers, machinery producers, advisory and researchers.

**FOSTERING THE USE OF COMPANION PLANTING AND COVER CROPS.** This is not yet mainstream or common practice among organic farmers, despite scientific knowledge and practical experience on benefits and management techniques developed many years ago, and with positive results. The practices can contribute much to soil fertility management, increase nutrient availability and prevent leaching. It also benefits weeds, pest and disease management and helps to build resilient systems able to cope with climate change and any other external change. Local Operational Groups should select the available knowledge and experiences that fit best with the local environment and test these on the farm to overcome the reluctance in accepting non-usual techniques. Demonstration of the benefits on commercial farms can assist widespread adoption and scaling-up. Other tools for dissemination include technical publications and decision trees.

The range of actors which could be involved includes farmers, advisory, local experimental stations, breeders, seed companies, researchers, but also processors and buyers.

**INTRODUCING NEW CROPS AND VARIETY TRIALS.** This can contribute to the solution of several problems through new, more appropriate crop rotations. Crop and variety trials are often already carried out in several regions and for several topics. Nevertheless, the outcome is not always taken up by farmers. Local Operational Groups could promote the use of such knowledge by organising local demonstration sites on commercial farms and by including quality aspects and nutritional traits in the assessment of the varieties. Among the actors to be involved, processors and buyers should not be neglected.

**DEVELOPING NEW FERTILISERS.** Closing nutrient cycles is an increasingly important challenge. Local/regional Operational Groups may initiate cooperation between e.g. municipalities, local food industries and farmers/advisers to evaluate possible ways to make waste products suitable for organic farming, bearing in mind all the principles of organic agriculture. The resulting products must be of appropriate quality, easy to handle and spread efficiently on the farm. It is also important to evaluate the ethical, ecological and economic viability.

The range of actors which could be involved includes farmers, advisers, researchers and regional processors.

**The FG experts also developed some general recommendations for the implementation of the proposals for innovative actions and Operational Groups:**

- to maintain a systems approach and the capacity to combine all specific solutions when proposing innovation to farmers. To strongly encourage the joint creation of knowledge (co-creation of knowledge between various actors, actively involving farmers in any process) as this will give more reliable results that will be taken up more rapidly if proposed to farmers by other farmers.
- to consider the need for local implementation/adaptation of techniques which are well known on the scientific side but still not put into practice.

- to consider the need for a range of tools for the dissemination of knowledge including social media, publications etc. and definitely also direct farmer to farmer contact and direct exchange.
- besides innovative technologies and tools, there is the need to increase farmers' craftsmanship.

### 3.1.2 b) Examples of practical solutions

As organic farming is somehow innovative by nature and as the concept of on-farm innovation is familiar in the organic community, the Focus Group decided to collect examples of practical solutions, which have already been implemented. Some can be considered a sort of model for Operational Groups, while other examples are not structured as such but share the basic concept of the EIP-AGRI, namely an interactive, participatory approach, a multi-actor team and start from a practical problem. Each case was described and briefly analysed highlighting success and failure factors as well as constraints in their potential replication and scaling-up.

Out of the 25 cases described, the group selected 5 based on the following criteria:

- innovation level
- assessment of results after a certain period of time
- practical problem solving orientation
- degree of multi-actor approach and capacity to broaden it
- potential for further implementation and follow-up in different areas .

The five selected examples are summarised below:

#### DUTCH CASE - PRESENTED BY WIJNAND SUKKELE

In 1998 in the Netherlands, several regional groups were established to define what organic farming was and how it should be implemented. This innovative method in the Netherlands was supported through the organisation of regional groups guided by an adviser and a researcher. They worked on various farm issues to learn about management of organic farming in a real knowledge sharing environment. They identified the main obstacles for organic farmers and established 8 groups, each working on different topics. Each group consisted of 5-7 farmers, researchers and other actors (machine builders sectors, ICT, other etc.).

The activity required intensive farm data registration and the results were tested for improvement. Half of these groups failed, but some were successful and continue today.

These groups illustrated that it is important to build trust within the group as this creates a basis for share knowledge, ideas and inventions.

#### DUTCH CASE - PRESENTED BY CHRIS KOOPMANS

Farmer networks were operational in the Netherlands from 2008 to 2012, guided by the organic association. They focused on different sectors within organic farming (vegetables, dairy, greenhouse, sheep and poultry...), and their aim was to bridge the gap between research and practice.

Farmers worked in groups with advisers and researchers to develop specific ideas, and many farmers visited other farms and collected and shared knowledge.

It was necessary to have an effective coordinator or facilitator leading the groups (so funding was required).

For some sectors it worked easily, for others it took several years to convince farmers that it was useful. However, two of the groups continue still and now the expenses for the facilitation are paid by the farmers themselves. Some groups are running with other funds and others finished due to lower interest/commitment of the participants.

#### GERMAN CASE – PRESENTED BY KARL KEMPKENS

Since 1993, participatory innovation groups have been established with the basic idea of testing one solution for a problem on different types of farms (potato blight for example). The process is that the researchers discuss with farmers on the origin of the problem and they each suggest solutions from and/or needs for research. Sometimes, the research is carried out directly on the farms, other testing takes place on research farms.

Researchers collect and analyse the data, they then come together with the farmers to see how the solution has been successful in the different contexts. After that, usually 80-90% of the farmers apply the solution, a rate that is to be considered a great success. Then other farmers are invited to see the results and if they want they can be involved in the activity and try the proposed solutions on their farms.

#### DANISH CASE- PRESENTED BY INGE BERTELSEN

The National programme for organic research and development supported the High Crop project in Denmark. The cost was 2 million €.

Farmers, researchers and advisers worked together on this project on closing the yield gap for arable crops. It followed on from a previous project and lasted 4 years. Important knowledge from researchers was brought to farmers and farmers explained to the researchers why they were not applying the knowledge (economic/practical reasons).

Farmers and researchers visited commercial farms and experimental farms together. The project involved advisers, inviting them to research stations to hold discussions about the on-going research (they did not have to wait for the final results to have the information).

They also ran research on commercial farms to assess if the proposed innovation was possible and acceptable in practice, thus facilitating the knowledge transfer.

Two decision tools were also developed. The tools are predictive instruments which can tell the farmer what will happen if he/she chooses one or another crop rotation, etc. and a picture tool was also developed. This picture tool is useful as the farmers choose which photo corresponds most to their farm today and what represents the vision of the future farm.

#### FRENCH CASE - PRESENTED BY STÉPHANE BELLON

The case is about the experience of 150 Roquefort farmers engaged in improving alfalfa quality and production. But even if the focus of the group was initially on a very specific element of the system (alfalfa) their common work led them to enlarge the area of study, resulting in the introduction of sainfoin into the crop rotation. Sainfoin was tested for several uses: grazing, hay, seeds. Last summer it served as a case study for the summer school on agro-ecology and that was the opportunity for economic and agronomic evaluation.

It is an example of how starting from the concrete problem of improving one crop it is possible to move to the improvement of the whole farming system.

**The cases are summarised below (a complete description is included in annex D):**

REFER ENCE N°	TOPIC AND AUTHOR	CONTENTS
C1	Videos for pest and diseases - Finland	Production of short videos showing a step by step process to manage pests and diseases video available to everyone via YouTube.
C2	Permaculture- Finland	Demonstration application of permaculture elements and methods for the design of ecological infrastructure and management of organic farms
C3	Soil amendments from paper industry - Finland	Example of recycling through appropriate composting and process of pulp and paper industry wastes. The product obtained is used on farm. Example applicable also to other areas with different industrial wastes.
C4	Green manures for dry areas - Austria	Research programme in Lower Austria, dry area, where green manure has demonstrated its positive impact and is proposed for practical use to farmers.
C5	Training on soil- Austria	An example of training programme targeting organic farmers, advisers, teachers and multipliers. It has been running in Austria for many years with good take-up rate.
C6	Tillage optimisation - France	An example of group work involving researchers and farmers for tillage optimisation in organic farming.
C7	Peri-urban agriculture - Spain	Example of on-farm research to support peri-urban agriculture through the identification of different crops and management strategies.
C8	Variety selection - Denmark	Production of an index tool that facilitates the assessment of varieties on their ability to suppress and tolerate weeds.
C9	Long term assessment - Spain	Evaluation of the effects on soil quality of long-term rotation in cereal crops
C10	Local varieties - Spain	Example of a Centre for conservation of local crop varieties
C11	Training and dissemination - Spain	Example of Centre for the support of organic farming practices through training courses, technical meetings for local farmers, magazine
C12	Protection of Baltic Sea - Germany	The use of organic farming practices for social benefit: protection of the Baltic Sea through a shift to organic farming.
C13	Adaptation to climate change- Germany	Innovation Network of Climate Change Adaptation
C14	Research-advisor cooperation - Finland	Research co-operation between researchers and advisors
C15	Fruit production groups - Italy	An action model for developing new technical options in organic farming and transferring knowledge.

C16	Heritage varieties - Italy	Protection and development of genetic heritage for the conservation of rural biodiversity
C17	Stockless organic farming - Sweden	Multi-stakeholder working group sharing experiences and knowledge to improve weed and nutrient management on stockless organic farms
C18	Composting - Portugal	Composting processes to minimise nitrogen losses
C19	New leguminous crops - Poland	Introduction of a new pulse crop – soybean - in Northern areas
C20	Introduction of new crops- Poland	Introduction of grain maize in Northern areas
C21	Weed management - UK	Participatory investigation on the management of weeds in organic production systems
C22	Climate change - UK	The Farm Carbon Calculator, organic farming and CO <sub>2</sub> emissions
C23	Participatory breeding - France	On-farm research and participatory breeding of wheat for organic and low input agriculture
C24	Knowledge co-production – The Netherlands	Combining on-farm research, knowledge sharing and participatory learning
C25	Cultivated biodiversity - France	Community-based management of cultivated biodiversity (Sainfoin): an initiative on forage crops by producers of AVEM (Roquefort area, France)

### 3.1.2 c) Simulating the setting-up of an Operational Group (methodology)

Based on an exercise to simulate the setting-up of an Operational Group on the topic addressed by this Focus Group, the experts demonstrated that there are different ways of approaching the Operational Group concept and also of attitudes to solving problems. The exercise also stressed that there is no one way to implement an Operational Group activity, but in order to be effective, the methodology and composition of the group must be adapted to not only the agronomic context, but (even more importantly) to the social and the environmental context.

In all cases, the role of facilitators is extremely important, as is the need to give rapid answers to farmers: even if they are interim or partial results, they need to be shared. This provides useful feedback on how to continue, but it also builds trust and commitment, which is even more important. Other key elements are the economic assessment of the proposed innovations and long term planning (at least 5 years but more if possible).

The meeting minutes include the full description of the three approaches, with details on key elements to be highlighted during the working of the Operational Group.<sup>14</sup>

14 [http://ec.europa.eu/agriculture/eip/focus-groups/organic-farming/index\\_en.htm](http://ec.europa.eu/agriculture/eip/focus-groups/organic-farming/index_en.htm)

### 3.1.2 d) Recommendations for future research topics and methodologies

On the topic of the Focus Group, there have been several EU, National and local research projects over the past years and some are still on-going. Annex C summarises the main projects at European and International level, but many National and Regional projects have also produced much valuable knowledge. Moreover, several projects which were not completely focused on organic arable farming systems have produced outcomes which are also valuable for organic farming.

Some issues still require a deeper understanding and for certain problems, a broader implementation study is needed. The research methodology used can make a crucial difference. For a rapid and efficient translation of research outcome into mainstream practical innovation, the Focus Group experts recommend a real participatory approach involving farmers, advisers and all pertinent actors from the beginning of the preparation of a proposal and not only at the project dissemination phase or simply in advisory boards. Such an approach requires time and resources to be dedicated to facilitation and to ensuring the participation of all actors (not only researchers). The multi-actor approach proposed in the Horizon 2020 framework<sup>15</sup> is an example but other solutions for specific topics can be used. The Focus Group experts reported several experiences of collaborative research with involvement of farmers and advisory, see 3.1.2.b.

The topics recommended by the Focus Group for future research programmes range throughout the main areas affecting the yield gap, they are the following:

- **Analysis of low phosphorous (P) and potassium (K) systems to understand how they function** and the mechanisms to improve P and K availability. The research should be based on case-studies and include on-farm activity. The topic is relevant in many EU regions and requires a participatory approach.
- **Identification of new sources of organic fertilisers** to identify their potential use and optimal use schemes (timing and modalities of application, doses etc.). The scope is to increase availability of adapted and cheaper fertilisers through the deep analysis of available sources and development of better processing and using methods. The topic is relevant at EU scale but requires local implementation.
- **Analysis of contribution of organic management practices on carbon sequestration, water holding capacity and erosion reduction.** The scope is to measure the contribution of organic farming to the preservation of natural resources and to guide EU and local policies accordingly. It should be based on a large number of case-studies and include an overall assessment of farming practice impact. The topic is relevant at EU scale and requires a strong interdisciplinary approach and a link to real cases.
- **Selection of varieties with increased resistance to abiotic stress** in order to allow decent production in any soil/climate type. It is relevant at EU scale but needs locally differentiated breeding approaches and implementation.
- **Adaptation of conservation agriculture techniques to organic systems**, where herbicides for example cannot be used. It requires the development of innovative machinery and tools but also the redesign of farming systems. It is relevant EU wide and needs large involvement of actors from practice.
- **Development of machines tuned to the needs of organic farming**, especially for soil management but also for weed control. The difficulty factor is the need for different machines adapted to specific farming systems, something that does not assure profitability to machine builders. This is why public research is needed.
- **Improvement of composting techniques adapted to different materials and establishment of innovative cooperation strategies** among farmers and other actors. It will increase nutrient availability and at the same time facilitate communities in recycling

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15 <http://ec.europa.eu/programmes/horizon2020/>

waste. It requires research not only on technological issues but also on organisation modes. Examples can be found in some EU areas and need to be studied and linked for a broader implementation.

- **Development of urban and peri-urban organic agriculture**, to improve their qualitative and quantitative performance. The research should include social aspects and must take steps from the existing examples.
- **Improvement of the knowledge on crop rotation multi-performance and development of locally adapted implementation monitored by multi-criteria tools.** It is a broad multidisciplinary topic that must include social and organisational innovation elements. It is a key aspect to reduce yield gap and requires on-farm research and broad participation of actors.
- **Knowledge increase on the predation of weed seeds and on allelopathic effects.** It is highly relevant in the strategy to manage weeds and requires a multidisciplinary approach. It is relevant at EU scale but must include local adaptation.
- **Development of improved inter-sowing and under-sowing systems**, to reduce weeds and optimise the system. It requires on-farm research and also farming systems approach and economic assessment.
- **Development of more precise and easy-for-use forecasting tools** for the management of pests and diseases. It includes ITC applications and to be efficiently taken up by practitioners it needs a participatory approach and practical application examples.
- **Development of highly diverse systems to prevent soil pathogens.** It includes the prototyping of resilient and preventive systems with a multi-actor approach.
- **Programming of delocalised and participatory breeding systems** to increase the availability of appropriate genetic materials. It is highly relevant at EU scale but needs local implementations with on-farm validation.
- **Re-framing of breeding criteria** including agronomic characters, quality traits and capacity to adapt to local systems and conditions. It requires a participatory approach and will deliver policy recommendations as well as practical examples.

### 3.1.2 e) Proposals for training and educational programmes

The Focus Group consider a common and mutual knowledge-sharing approach as essential in elaborating the activities proposed above.

The Focus Group experts suggest the establishment, under the EIP-AGRI initiative, of a **network of knowledge centres** able to gather and facilitate the use of scientific and practical knowledge. It would link dispersed knowledge and foster the exchange among regions and actors. It must have local implementation but with European coordination. It is proposed for funding by H2020 and local Rural Development Programmes. Besides, it may include a **network of commercial demonstration/show-case farms** for the assessment and demonstration of innovative solutions. Using commercial farms for this can reduce public costs and can enhance credibility.

The activities proposed below can be taken up by local training programmes but they are also valuable recommendations for broader education and training frameworks such as, for example, the Erasmus + programme. The proposals can be developed into projects within key action 2 "cooperation for innovation and exchange of good practices" of the Erasmus + framework. The specific tools that would fit the purpose are the "strategic partnership" and the "knowledge alliances".

The main suggestions formulated by the experts for efficient training and educational programmes are:

To give space and relevance to **practical on-farm training** also for researchers and advisers, not only for farmers. This will provide a link to practical implementation and develop the capacity of different actors to interact. To develop **craftsmanship** and not only technological knowledge. They are both important, but too often the first is neglected in training programmes and there are no chances or opportunities to improve it. To organise a **system of training** with links between the events and courses, including demonstration events or participatory research actions etc., and logical connection allowing participants to organise his/her personal educational path to personal/farm needs. There is the need **to involve all actors of the value chain** (from farmers to consumers, passing through processors, traders, wholesalers etc.) in education, in order to bridge the *cultural gap* that often hampers the development of organics, due to the lack understanding of the characteristics of organic materials and products by the intermediate and final actors of the chain.

There is also a need to build a **link between schools and farms**. It is true for any school level from primary, but with higher relevance for farmer and adviser schools. A good connection, as for example in stable schools or farm schools in Denmark, allows a rapid update of professional and practitioners and develops a practical approach and the capacity to work in interdisciplinary teams from a young age. **Farmer-to-farmer training** should be considered as a primary tool as it always delivers good results in terms of reliability, relevance of the topics involved and efficiency. There are good experiences in several regions involving farmer groups or visit exchanges between colleagues (or multi-actor groups). There is a need to develop **new tools for knowledge sharing**, based on ICT and social media or other on-line tools (particularly for younger generations). They can offer a solution to the need for rapidity and continuity in the training actions and also reach a broad audience in the short time and with limited resources.

The Focus Group also identified some specific topics that training and education programmes should primarily consider:

The use of **Information and decision support systems**, applicable in rotation planning and in the management of fertilisation plans and plant protection strategies. Many of these tools are available and often specifically developed for each region and farming system. Nevertheless, they are seldom used by organic farmers who probably have to overcome a cultural barrier to start using them. The topic is relevant for the training of farmers and advisers.

**Tillage optimisation**, concerning choice of appropriate tools but also soil management strategies (linked to previous point). The topic is relevant for the training of farmers and advisers.

**Functional biodiversity**, as the concept is integral part of the organic culture and research has produced important findings, nevertheless, practical implementation is limited. This is partly due to the need for specific on-farm contextualisation but often local examples are missing and also extension services cannot provide sufficient support. The topic is relevant for the training of farmers and advisers but also for all the actors of the value chain and researchers.

**Use of innovative communication tools** such as apps, social media etc. Younger practitioners are more prone to use them than older ones, so training would be useful for these older practitioners so that they can become acquainted with the tools. They can be valuable and cheap tools to connect all the actors of the value chain and facilitate the exchange of experiences at a large scale (inter-regional and international) and also to connect researchers with practitioners. Especially in the organic sector where farmers are so dispersed, such tools can play an important role in connecting them. The topic is relevant for the training of farmers and advisers.

## Proposal for an activity framework

In the last session of the Barcelona meeting, the experts also produced a proposal for an activity framework that could be a useful guideline for the implementation of Operational Groups.

The framework is as follows:

1. to define the "situation problem", for example stockless farming, or mixed cropping system or dependence on external inputs...
2. to identify a "first order proposal", that should be intended as co-designing proposal. For example diversification, crop rotation with inclusion of leguminous crops, organisation of new markets and correlated storage and processing.
3. To identify a "second order proposal" ie. where to work on the interaction of different areas or domains? In this phase, visits of different experiences or case studies are included.
4. To move to a "third order proposal" where all areas are put in correlation. It includes specific innovation, ie. predictive tools or machinery for weed management etc.

The Focus Group experts advise that the EIP-AGRI Service Point could produce a repertoire of innovations establishing a network among them, giving value to their diversity and facilitating the exchange between cases based on the same problem situation.

## Next Steps

Wrapping up the many outcomes and ideas produced by the Focus Group experts, we clearly see the need for a strategy combining different means to achieve the goal of optimising organic arable yields (including quality and environmental services) in the large majority of European organic farms.

These means include practical actions to promote the use of available scientific and practical knowledge, proposals for education and training of different actors to increase the flow of knowledge and awareness across the whole value chain, and specific research activities.

Many of the proposed means focus on specific issues, nevertheless, it is of utmost importance to maintain a systems approach and the capacity to contextualise available knowledge into the specific systems (agronomic, social, environmental, economic) one is operating in. Understanding the value of diversity and finding ways to maintain it is key to a successful implementation of any innovation serving the goals of organic farming.

To facilitate the use of the Focus Group's outcomes, the group has prepared a plan for disseminating the results so that they may reach as many of the people concerned as possible.

All Focus Group experts committed to further disseminate the result of the work at their regional and National level and are keen to participate in the setting-up of Operational Groups on issues related to organic farming and reduction of yield gaps.

The EIP-AGRI service point will disseminate the Focus Group outcomes via the EIP-AGRI in the dissemination materials produced, in the dedicated webpage and also in seminars and meetings in the Member States.

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## Website resources

[www.agroecology.org](http://www.agroecology.org)

[www.organic-world.net](http://www.organic-world.net)

<http://ec.europa.eu/programmes/horizon2020/>

[www.eip-agri.eu](http://www.eip-agri.eu) (operational May 2014), until then: [http://ec.europa.eu/agriculture/eip/focus-groups/organic-farming/index\\_en.htm](http://ec.europa.eu/agriculture/eip/focus-groups/organic-farming/index_en.htm)

## Annexes

### Annex A. List of members of the Focus Group

#### EXPERTS:

Johann Bachinger (Scientist)  
Stéphane Bellon (Scientist)  
Inger Bertelson (Advisory services)  
Miguel Brito (Scientist)  
Véronique Chable (Scientist)  
Monica Coletta (Adviser)  
Karl Kempkens (Adviser)  
Chris Koopmans (Scientist)  
Marco Locatelli (Farm manager)  
Luisa Manici (Researcher)  
Benoit Nezet (Adviser)  
Nadia Riguccini (Farmer and agronomist)  
Joan Romanyà (Scientist)  
F. Xavier Sans Serra (Scientist)  
Ulrich Schmutz (Scientist)  
Jozef Tyburski (Researcher, also a farmer)  
Wijnand Sukkel (Scientist)  
Maria Wivstad (Scientist)  
Aira Sevon (Farmer)  
Alfred Grand (Farmer, involved in research)

Cristina Micheloni (Key Expert)

*\*Scientist refers to natural & social sciences*

## Annex B: List of examples for operational groups

Type of action	Topic	Thematic area concerned	Goals	Actors involved	Scale/level of implementation	Details	relevance
<b>1. Regional and inter-regional operational groups</b>	<b>1.1 farming systems co-design</b>	nutrient management; soil fertility management; weed management; climate change	Increase total biomass production and productivity as a consequence, enhance microbial soil activity and nutrients availability, decrease weed pressure and increase resilience to climate change	Local experimental stations, advisory, farmers, local authorities, business (processors, traders, transport agency)	EU relevance but local/regional implementation	It should include new crops and new crops combinations (relevance of legumes), mixed-farming, agroforestry elements and they should be supported by software tools and implementation guidelines <b>Dissemination through:</b> Case studies, demonstration on farm, pilot farms, exchange on principles	It is relevant for all EU areas and farming systems even if it needs to be implemented locally with specific characteristics. As a consequence it should be considered of highest priority. It is the key aspect for the future of organic farming that should pass through despecialisation and use crop rotation as key for environmental problem solving.
	<b>1.2 Information and decision support systems</b>	nutrient management; weed management, pest and disease management	To make use of available technological tools and knowledge and develop them further for site specific implementation	Technology providers, advisory, farmers, researchers	EU relevance but local/regional implementation	All technologies (smartphone apps, web applications...) should be explored	A global tool can be developed and later adapted to specific groups, having common basis but regional adaptation. <b>Geographic scale:</b> relevant everywhere and need for adaptation <b>Relevance:</b> medium relevance, user-friendliness is highly relevant
	<b>1.3 Increase of soil microbial activity and biodiversity (including N-fixing) by farming</b>	soil fertility management;	To enhance soil fertility and nutrients availability at low costs	Local experimental stations, advisory, farmers, public authorities, recycling industries (for quality organic matter) and	EU relevance but local/regional implementation	In can be included in 1.1 but for certain areas it can be dealt with as specific topic. Suggestion for dissemination:	It is generally important but higher priority on Mediterranean basin where organic matter is low and temperatures are high, there is less livestock. Also area with high risk of leaching should be considered as priority as well as stockless farms and horticulture.

	<b>techniques</b>			researchers (new technology to adapt nutrients supply with crop demands)		demonstration activities and farm days; meetings for advisers, researchers, practitioners, networking	
	<b>1.4 Composting techniques fine-tuning</b>	soil fertility management;	To enhance soil fertility and nutrients availability at low costs and recycle waste from agriculture, food industries and other source (multifunctionality of agriculture)	Waste managers, local decision makers, machinery producers, advisory, farmers, researchers and public authorities	EU relevance but trans-regional implementation	It requires specific implementation techniques based on locally available materials, amounts and machinery	In the compost sector there are consolidated technologies for medium quality composting but lack for high quality production. Geographic scale: relevant everywhere, especially on degraded soils, specialized high value crops and extensive production but depends on local availability of materials.
	<b>1.5 Nutrient release of organic fertilisers</b>	Nutrient management, soil fertility, environmental conservation	Increase nutrient release with crop demand for higher productivity and lower nutrient losses	Advisers, farmers, researchers, regional authorities	EU relevance but local/regional implementation	It requires site-, crop-, and crop rotation-specific, implementation	In the compost sector there are consolidated technologies for medium quality composting but lack for high quality production. Geographic scale: relevant everywhere, especially on degraded soils, specialized high value crops and extensive production but depends on local availability of materials.
	<b>1.6 use and fine-tuning of new machines and tools</b>	Soil fertility management, nutrients management, weed management, pest and disease management, climate change	To give guidance at practical local use	Farmers, advisers, local experimental stations, machine builders	Local implementation coordinated at least at macroregional level	Equipped with precision tools and at affordable prices	It is relevant for all EU areas and farming systems, and is a key factor for increased productivity and efficient resource use of on- and off-farm organic inputs. It is particularly relevant for specialized crops and in areas with difficult soils.
	<b>1.7 Structuring of joint purchase of machines (machine rings)</b>	Weed management, soil fertility management, pest and disease management	To supply modern machinery to small or non specialised farms at affordable costs	Farmers, local decision makers	Local implementation	Good examples under development, contractual constrains, social innovation	It is not new in many countries. The experience of some countries can serve the others. High relevance where it is not in practice.
	<b>1.8 Selection of</b>	Variety choice; weed management;	To make available to each farmer the genetic materials most adapted	Researchers, farmers, breeders, advisory, consumers	EU relevance but local/regional implementation	Good example of system approach, running experiences	Geographic relevance: EU wide, global structure but local implementations It is part of the solution for management

	<b>robust varieties</b>	pest and disease pressure management	to his/her farming system and market, so decreasing production costs and enhancing quality and profitability			in France, Austria and The Netherlands. Special focus on leguminous crops; heterogeneous materials; on-farm breeding	but quality should be the first issue, adapting management consequently.
	<b>1.9 Innovative tillage techniques</b>	Resilient systems	To maintain production levels and protect soil fertility under climatic changes	Researchers, farmers, machinery producers, advisory	EU relevance but macro-regional implementation	It can be part of 1.1	Relevance: medium
	<b>1.10 Cover crops and companion planting</b>	Soil fertility management, nutrients management, weed management, pest and disease management, climate change	To adapt available knowledge at local needs and facilitate introduction of unusual practices	Farmers, advisory, local experimental stations, breeders, researchers, processors	Local implementation coordinated at macro-regional level	It can be part of 1.1 but also a specific aspect to be developed autonomously. how to disseminate: technical leaflets, decision trees, involvement of seed companies	Area of relevance: all EU link to 1.1 high relevance everywhere
	<b>1.11 Introduction of new crops and variety trials</b>	Resilient systems	Facilitate rapid uptake of non-common crops/variety	Farmers, advisory, local experimental stations	Local implementation	It can be part of 1.1	Is it specifically needed in geographic areas more affected by climate change but in general is an important issue
	<b>1.12 Development of new fertilisers</b>	nutrient management	To make available efficient and cheap fertilizers	Fertilizers producers, farmers	Trans-regional, based on locally available sources of inputs	The cost factor is of utmost importance	Specific relevance
	<b>1.13 development and use of local breeds, on-farm breeding and seed production and selection of heterogeneous materials</b>	variety choice	To allow the use of most appropriate genetic material	Farmers, breeders, EU, National and local authorities, researchers	EU, national, local	It is a recognized problem on which EU and National governments are focused. how to disseminate: knowledge sharing between local/regional/EU scale.	The process is on-going Area of relevance: all EU high relevance

## Annex C. List of existing relevant research projects

TOPICS	COUNTRY/ COUNTRIES	NAME	DESCRIPTION	START /END	FUNDING	COORDINATOR	WEB-PAGE
Breeding	EU	Farm Seed opportunities	Inventory of EU experiences and description of local varieties; identification of legal solutions for trade, exchange and use	2009-2011	6FP	Veronique Chable- INRA- F	<a href="http://www.sad.inra.fr/en/All-the-news/Farm-Seed-Opportunities-European-project">http://www.sad.inra.fr/en/All-the-news/Farm-Seed-Opportunities-European-project</a>
Breeding	EU	SOLIBAM	Integration of breeding and crop management for organic and low input crops	2010-2014	7FP	Veronique Chable- INRA- F	<a href="http://www.solibam.eu">www.solibam.eu</a>
Breeding	transnational	COBRA	Coordinating Organic plant Breeding Activities for Diversity	2013-2015	Core-Organic II	Robbie Girling- Organic Research Centre- UK	<a href="http://www.organicresearchcentre.com/?qo=Research%20and%20development&amp;page=Plant%20breeding&amp;i=projects.php&amp;p_id=42">http://www.organicresearchcentre.com/?qo=Research%20and%20development&amp;page=Plant%20breeding&amp;i=projects.php&amp;p_id=42</a>
Soil fertility, nutrient management, quality	transnational	AGTEC-ORG	Methods to improve quality in organic wheat: agronomy, technology, soil management, nitrogen fertilisation and green manure	2007-2011	Core-Organic I	Christophe David- ISARA-F	<a href="http://core1.coreorganic.org/research/projects/agtec-org/index.html">http://core1.coreorganic.org/research/projects/agtec-org/index.html</a>
Nutrient management	transnational	IMPROVE-P		2013-2015	Core-Organic II	Kurt Möller, Hohenheim University D	<a href="http://www.coreorganic2.org/Upload/CoreOrganic2/Document/COIL_projects_3rd_call ImproveP.pdf">http://www.coreorganic2.org/Upload/CoreOrganic2/Document/COIL_projects_3rd_call ImproveP.pdf</a>
Cover crops, soil fertility	transnational	TILMAN-ORG	Cover crops and reduced tillage	2011-2014	Core-Organic II	Paul Mäder -FIBL- CH	<a href="http://www.tilman-org.net/">http://www.tilman-org.net/</a>
Disease management	EU	CO-free	Replacement of copper use	2012-2016	7FP	Annegret Schmitt - Julius Kühn- Institut -D	<a href="http://www.co-free.eu/">http://www.co-free.eu/</a>
Cover crops	EU	OSCAR	Cover crops management and conservation agriculture	2012-2016	7FP	Maria Fink- Kassel University - D	<a href="http://web3.wzw.tum.de/oscar/index.php?id=2">http://web3.wzw.tum.de/oscar/index.php?id=2</a>

Breeding, nutrient management, diseases management, resilience	EU	WHEALBI	Genomic and agronomy for wheat and barley improvement	2014-2019	7FP	Gilles Charmet INRA	<a href="http://www.organicresearchcentre.com/manage/authinclud es/article_uploads/WHEALBI%20press%20release.pdf">http://www.organicresearchcentre.com/manage/authinclud es/article_uploads/WHEALBI%20press%20release.pdf</a>
Innovative agroforestry systems development	EU	AGFORWARD	Agroforestry development in EU	2014-2017	7FP	Paul Burgess-Cranfield University-UK	<a href="http://www.agforward.eu/index.php/en/">http://www.agforward.eu/index.php/en/</a>
Soil management, nutrient supply, pest and disease management, weed management	transnational	INTERVEG	Multifunctional benefits of mulching and intercropping in vegetables	2013-2015	Core-Organic II	Stefano Canali – CRA – I	<a href="http://www.coreorganic2.org/Upload/CoreOrganic2/Document/Leaflet_Interv eq_2012.pdf">http://www.coreorganic2.org/Upload/CoreOrganic2/Document/Leaflet Interv eq_2012.pdf</a>
Systems approach	National	DYNRURAB IO	Development of more productive and sustainable organic systems	2010-2013	French National Agency	Marc TCHAMITCHIAN, INRA Avignon, F	<a href="http://www.agence-nationale-recherche.fr/en/anr-funded-project/?tx_lwmsui_viblan_pi2%5BCODE%5D=ANR-10-STRA-0009">http://www.agence-nationale-recherche.fr/en/anr-funded-project/?tx_lwmsui_viblan_pi2%5BCODE%5D=ANR-10-STRA-0009</a>

## Annex D: Documented best practices

### C1.

**Author:** *Mr Reijo Käki, senior advisor with Finnish Organic Association (via FG expert Aira Sevon)*

**Title:** *Teaching ecological farming via Youtube videos*

**Which kind of action is it?**

*This is inexpensive way to deliver demonstration activity and training and local circumstances applied research to any farmer who has access to internet.*

**Key-words**

*Youtube manual for eco-farming, rapeseed*

**Which of "our" topic areas are involved?**

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

**EIP Focus Group Themes**

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

*You tube –videos can be used for nearly anything, obviously the content*

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

**Briefly describe the action, what activities are included and which results they produced/are producing**

*Young eco-farmers together with Finnish Organic Farmers' Association and seasoned senior advisor Mr Reijo Käki made an instruction filming project where the first part is how to grow ecological rapeseed in our climate, also available to conventional farmers who are interested in growing without neonicotinoides. It described step by step how to avoid pests and diseases, how to grow this and how to prepare the soil. The second part is a film, how to grow malt barley. You tube is in short form for everybody to use. Longer educational dvds can be obtained from Finnish Organic Farmers Association.*

**Who are the actors involved?**

*Senior Advisor and experienced farmer Mr. Reijo Käki together with Eco-farmers and Finnish Organic Farmers Association. Financing came from Ministry of Agriculture and Forestry.*

**Who launched the initiative? And when did it start/end?**

*It was a mutual interest. Started 2013 and will continue next growing season with how to grow eco malt barley.*

**Was it a success or a failure?**

*SUCCESS, which lies in its practicality, everybody can reach it and use it.*

**Which are the strong points for the success (partial or total)**

*You can get easily and from anywhere a grip of the practice and get started, it is an excellent way to convey the experiences of other farmers. Anybody with internet can access the film.*

**Which are the weak points (for failure or for improvement)**

*Making a film is expensive and financing was low, it can be seen in technical quality of the film. Cutting and voice could and should be better.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Yes it can be replicated to nearly anything. It cannot of course replace the basic knowledge of a farmer that have to be obtained first. Ecological but also conventional farmers in practice can be encouraged to learn more on particular farming techniques.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Use existing new media and inexpensive methods to spread the experiences of other farmers, who very often do not like to read. These videos can be shown in local farmers' association gatherings, discussed and gathered further the experience of others.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

[www.youtube.com/watch?v=JgCQtGXkyLE](http://www.youtube.com/watch?v=JgCQtGXkyLE)

**Contacts**

*Mr Reijo Käkki, senior advisor, [reijo.kakki@gmail.com](mailto:reijo.kakki@gmail.com)*

## C2.

**Author:** Dr. Tuomas Mattila (via FG Expert Aira Sevon)

**Title:** Ecological redesign of a boreal grain farm

### Which kind of action is it?

*Demonstration activity, farm scale practical testing of theoretical concepts.*

### Key-words

*erosion control, ecological engineering, contour farming, agroforestry, holistic management*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Application of permaculture and other ecological design methods (Holistic management, Keyline) to an organic farm in the Boreal zone. Agroforestry, improved contour cultivation and enhanced carbon sequestration through root biomass increase. The aim is to get better control of the water cycle in order to reduce nutrient loss, increase yields, provide biodiversity habitat and improve soil conditions. Fields have been contoured, multispecies windbreaks have been planted and the most erosion prone areas have been converted to orchard silvopastures. Erosion has stopped and soil quality is improving with better water distribution. Results have been disseminated in trade magazines and reports.*

### Who are the actors involved?

*Kilpiä farm & stakeholders, Centre of Economic Development, Transport and Environment (ELY keskus)*

### Who launched the initiative? And when did it start/end?

*The current farmer of Kilpiä. Started in 2010, still ongoing.*

### Was it a success or a failure?

*Seems like a success. Erosion rates are down, soil quality and yields are increasing.*

### Which are the strong points for the success (partial or total)

*The foundation in basic science, simple and cost effective solutions applied. No external funding to complicate on-farm decision-making.*

**Which are the weak points (for failure or for improvement)**

*Lack of communication and networking with similar initiatives.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*It could be replicated on all farms with sloped fields. These are also the main source of erosion and eutrophying emissions in the landscape. Best applied to situations with seasonal high water flow rates (rain or snowmelt).*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Use of publicly available LIDAR data and low cost contouring equipment. A whole farm approach.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources : Private funding on farm.

**Website**

*<http://www.kilpiantila.net>*

**Contacts**

*Tuomas Mattila, [tuomas.j.mattila@gmail.com](mailto:tuomas.j.mattila@gmail.com)*

### C3.

**Author:** Juuso Joonas, Master of Agricultural Sciences, Finland (via FG expert Aira Sevón)

**Title:** Carbon and nutrient management with industrial wood fibre by-products

**Which kind of action is it?**

*A solution to exploit by-products pulp and paper industry to manage soil carbon and nutrients. Helping farmers to restore more easily and rapidly exhausted soils with slowly decomposable wood fibres. Making the conversion to organic farming easier and more economically viable.*

**Key-words**

*Soil organic matter, carbon sequestration, nutrient management, industrial by-products, soil improvement fibres.*

**Which of "our" topic areas are involved?**

**Consider the list below but feel free to describe it with some details**

- x nutrient management
- x soil management
- variety choice
- pest and disease management
- weed management
- x system resilience
- knowledge sharing

**EIP Focus Group Themes**

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- ✳ Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

**Briefly describe the action, what activities are included and which results they produced/are producing**

*The pulp and paper industry produces megatons of by-products which are valuable soil improvement materials in agriculture. In Finland, methods have been developed to integrate these often nutrient-poor materials to crop rotation, to benefit the farmers and the industry. The advantages are to add water and nutrient holding capacity, and microbiological activity, to name a few. With these "soil improvement fibers", exhausted soils can be restored and by their slowly decomposable organic matter the carbon can be put back where it belongs.*

**Who are the actors involved?**

*Farmer, researcher and entrepreneur Juuso Joonas, pulp and paper industry, farmers*

**Who launched the initiative? And when did it start/end?**

*Juuso Joonas launched the initiative in 2011 and the use of the solution is growing all the time.*

**Was it a success or a failure?**

*A growing success.*

**Which are the strong points for the success (partial or total)**

*Exploiting the by-product of the industry for the farmer's advantage. Storing carbon and avoiding emissions of the farming and industrial production.*

**Which are the weak points (for failure or for improvement)**

*Farmers' consciousness about the importance of the soil organic carbon. Threat of EU's organic regulation to ban industrial by-product use in organic farming.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Both, widely where pulp and paper industry exists.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*The solution to integrate nutrient-poor organic amendments to crop rotation.  
To exploit industrial by-products in agriculture. To restore exhausted soils for a more rapid conversion to organic agriculture.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programs
- Other sources

**Website**

[www.tyynelanmaaparannus.fi](http://www.tyynelanmaaparannus.fi) (in Finnish)

**Contacts**

*Mr. Juuso Joonas, juuso.joonas@tyynelanmaaparannus.fi*

## C4.

**Author:** Alfred Grand

**Title:** Green manuring (winter Cover Crop) research with farmers' participation

### Which kind of action is it?

*A research programme on one side, but with strong participation of the farmers, because they do the work with their machines. Also a demonstration programme for farmers but also other stakeholders in agriculture.*

### Key-words

*organic farming, green manuring, cover crops, training, research*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- x nutrient management
- x soil management
- x variety choice
- x pest and disease management
- x weed management
- x system resilience
- x knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- x Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- x Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*A research programme for green manuring systems on organic farms in Lower Austria, which are under the condition of a precipitation of less than 530 mm was developed by Bio Forschung Austria. Different soil preparation, time of seeding, seeding technology, seed mix variations etc. were tested (20 to 30 treatments). Germination rate, weed suppression, nitrogen fixing capacities, biomass production (above and below ground), costs, economic benefits etc. were evaluated. The aim was to do practical research on the farmer's field with the help of farmers using their own equipment. At two field days and several tours the results were presented and discussed to the agricultural community.*

### Who are the actors involved?

*Bio Forschung Austria (research institute), Maschinenring Hollabrunn Horn (farmers' organisation for cooperation and for sharing agricultural machineries), Bio Austria (organic farmers' association), farmers*

### Who launched the initiative? And when did it start/end?

*Bioforschung Austria and organic farmers*

### Was it a success or a failure?

*Success for farmers in technical aspects but also in awareness and participation on research*

**Which are the strong points for the success (partial or total)**

*Farmers were directly involved in practical research from the beginning of each trial (had to use and adapt their own machinery), location changed every year and therefore participants too, focus on presenting the results to as many stakeholders as possible (farmers, press, society, politicians, decision makers, students of agricultural schools and universities etc.)*

**Which are the weak points (for failure or for improvement)**

*Depends each year on the financial support*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Yes, similar research projects have started in other regions in Austria and Czech Republic*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*The most important innovation is coming from changing the location and the direct participation (and therefore acceptance) of the farmers. Each year, the already established community and the people from the area are reached by the research results.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programs
- Other sources

**Website**

-

**Contacts**

*Bioforschung Austria, Dr. Wilfried Hartl: w.hartl@bioforschung.at*

## C5.

**Author:** *Alfred Grand*

**Title:** *Soil practitioner training in Austria*

### **Which kind of action is it?**

*A training programme for farmers which later also act as multipliers*

### **Key-words**

*soil, training, organic, farming*

### **Which of "our" topic areas are involved?**

**Consider the list below but feel free to describe it with some details**

- x nutrient management
- x soil management
- variety choice
- x pest and disease management
- x weed management
- x system resilience
- x knowledge sharing

### **EIP Focus Group Themes**

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- x Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### **Briefly describe the action, what activities are included and which results they produced/are producing**

*The soil practitioner training is an Austrian training programme for organic farmers, consultants, teachers and multipliers. The nine training days (81h) are broken up through the whole year and provide theoretical and practical sessions for the following topics: Soil - Source of Life (18h), Soil and Plant Interaction (18h), Eco-systemic Soil Condition Analytic (9h), Soil Cultivation (14h) and Presentation Technique (22h). The programme ends with the presentation of small projects in front of a jury and a certificate. The participants are motivated not only to use the given information for themselves, but also to present their know-how to the society. There is a conference day for the graduates once a year.*

### **Who are the actors involved?**

*Bio Austria (organic farmers' organisation), Bio Forschung Austria (research institute), LFZ Raumberg-Gumpenstein (school and research centre), LFI (training division of the Austrian chamber of agriculture) scientists, farmers.*

### **Who launched the initiative? And when did it start/end?**

*Bio Austria, Bio Forschung Austria, LFI. The programme itself is certified by the Austrian Ministry of Agriculture. Started in 2007.*

### **Was it a success or a failure?**

*Huge success: 650 trainees in 44 trainings. High reputation within the farming community!*

**Which are the strong points for the success (partial or total)**

*The programme is now extended to Germany, Czech Republic, (Slovakia and Hungary in preparation), in 2012 it was awarded by European Landowner Organisation with the Land and Soil Management Award. Participants are giving tours on their farms to raise awareness*

**Which are the weak points (for failure or for improvement)**

*€ 200,— to € 500,— farmers' contribution,*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Yes, meanwhile it is replicated with other topics like pasture management, cow keeping and sheep keeping, but also replicated in other countries.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*The trainees are not only educated in technical topics, but are also given awareness and trained to multiply this knowledge to the society!*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programs
- Other sources

**Website**

-

**Contacts**

*Bioforschung Austria: Dr. Wilfried Hartl: w.hartl@bioforschung.at  
Bio Austria: DI Christa Gröss: christa.groess@bio-austria.at*

## C6.

**Author:** *Benoît NEZET*

**Title:** *Tillage optimisation in organic farming in France*

### **Which kind of action is it?**

*This action is a research programme on tillage impacts on soil quality and crop production in organic farming. A wide range of implementations have been tested and demonstrated through three main regions in France.*

### **Key-words**

*Experience sharing, tillage systems, new tillage techniques, soil management.*

### **Which of "our" topic areas are involved?**

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### **EIP Focus Group Themes**

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### **Briefly describe the action, what activities are included and which results they produced/are producing**

*Tillage systems of French organic farmers were studied on three different types: traditional ploughing, a mix of ploughing/no ploughing in the crop rotation and no ploughing in order to preserve soil biological quality. Fifteen partners took part into the project, including a local experimental station of the Chambers of Agriculture in Brittany. Regarding technical feasibility of no ploughing, weeds control, inter cropping and impact on soil quality in particular on soil microbial activity. This project aimed to study farmers' needs and concerns in terms of tillage. Also, it had to gather knowledge on tillage impacts on soil quality in different local conditions. The project ended up sharing experiences and knowledge in order to build decision tools. Currently, the results and implementations are taken into account through trainings for farmers.*

### **Who are the actors involved?**

*Farmers (mixed farming and crop farming) from three regions in France, researchers (ISARA, INRA...) in local experimental stations and advisors (Chambers of agriculture) were involved in this action.*

### **Who launched the initiative? And when did it start/end?**

*The French technical institute of organic farming (ITAB) and colleges of agriculture (ISARA Lyon, ESA*

*Angers) launched the initiative in 2001. The project ended up in 2007.*

**Was it a success or a failure?**

*The study was successful and innovative solutions took place with new tillage techniques.*

**Which are the strong points for the success (partial or total)**

*It determined the conservation tillage suitable for organic farming: in terms of weed control, preservation of soil quality and fertility, physical properties, nitrogen supply and crop rotations.*

**Which are the weak points (for failure or for improvement)**

*The successful adoption of conservation tillage in organic farming is not proven and further research is required. Particularly, innovative approaches for the application of conservation tillage, such as perennial mulches, mechanical control of cover ground crop and controlled traffic, require further practical assessment.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*A high standard of management is required, tailored to local soil and site conditions. The success of conservation tillage in organic farming hinges on the choice of crop rotation to ensure weed control and nitrogen availability. Innovative cultural techniques, such as undersowing of crops into rolled cover crops could be explored in different regions with temperate climates. Arable crop systems, mix systems and vegetable crop systems are concerned. Conservation tillage includes no-tillage systems.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Measure methods of soil microbial activity and earthworm activity were established with scientific experts. A fast application was implemented in order to identify and evaluate earthworm populations. This project has permitted to go further with the participation of researchers, farmers, practitioners, advisers and students in meetings and local demonstrations.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

[www.itab.asso.fr/programmes/wdusol.php](http://www.itab.asso.fr/programmes/wdusol.php)

**Contacts**

*Nom : Laetitia FOURRIE*

*Email : [laetitia.fourrie@itab.asso.fr](mailto:laetitia.fourrie@itab.asso.fr)*

## C7.

**Author:** *F. Xavier Sans Serra*

**Title:** *The project of the conversion of the Rural area of Gallecs to organic farming*

### **Which kind of action is it?**

*This action started as an interactive innovation group because several stakeholders (farmers, managing body of the rural area and researchers) designed a new agricultural model for the Rural area of Gallecs to overcome the critical situation of farming activity. The periodic contact with experienced organic practitioners, advisors and researchers from different areas of Spain allowed them to co-design the farming systems. The participation of the University was important for the initiation of the project, and the current research and teaching activities are supporting the development of this unique project. The pilot experience of the Rural area Gallecs has an important role in revitalising organic production in Catalonia.*

### **Key-words**

*Periurban agricultural area, agro-ecological transition, organic arable cropping systems, Agroecological Farmer's Union, University of Barcelona.*

### **Which of "our" topic areas are involved?**

**Consider the list below but feel free to describe it with some details**

- X nutrient management
- X soil management
- X variety choice
- X pest and disease management
- X weed management
- X system resilience
- X knowledge sharing

### **EIP Focus Group Themes**

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- X Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- X Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp.

### **Briefly describe the action, what activities are included and which results they produced/are producing**

*In 2005, 11 farmers with the collaboration of the Consortium of the Rural area of Gallecs decided to transform 63.57 hectares of conventional arable dryland crops to organic management that were extended to more than 200 hectares during 2013. The Agroecosystems Research Group of the University of Barcelona collaborates with the Consortium and evaluates the transition process from an agronomic, environmental and economic point of view. The project is partially funded by the Department of Agriculture, Food and Rural Action of the Catalan Government. It is intended to carry out a new model of crop management economically sound and respectful with the environment in order to favour the biodiversity, to protect and improve the soil quality, to recover traditional crop varieties that can guarantee food quality.*

### **Who are the actors involved?**

*The actors involved are the managing body of the Rural area of Gallecs, the Department of*

*Agriculture, Food and Rural Action of the Catalan Government, the Agro-ecological Farmers' Union and the University of Barcelona. Other researchers from other Universities have also collaborated in analysing the agronomic performance of some local crop varieties.*

**Who launched the initiative? And when did it start/end?**

*The Consortium of Rural area of Gallecs in collaboration with the University of Barcelona. The main incentives to the farmers to start the conversion have been: (i) an increasing environmental awareness (result of their emotional relationship with the area, the singularity of the space and the respect for the nature) with the goal to watch over the preservation of the territory for a long term through the application of sustainable agricultural practices; and the possibility to achieve an added value in the products that they cultivate, and therefore an economic feasibility of the management of their exploitations.*

**Was it a success or a failure?**

*The project is successful because currently more than 200 hectares are organically managed belonging to 18 farmers and some young farmers have been engaged in the project.*

**Which are the strong points for the success (partial or total)**

*After eight years of agroecological management of the Rural Area of Gallecs, it highlights the (i) increase of farmer's incomes, (ii) the conservation of natural resources and the reduction of biodiversity losses, (iii) the food production in relation to the local needs (local market). The project also fosters the role of the area for several complementary activities such as education, recreation for urban people and research activities.*

**Which are the weak points (for failure or for improvement)**

*The main weak point of the project is the land tenure because farmers are not owners of lands and consequently it is indispensable to solve this ancient problem to give them stability and to make possible the continuity of the traditional uses.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*The replication could be possible, a strong leadership it is absolutely necessary aiming to advise farmers on technical, commercial and administrative issues and create the necessary synergies between them.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be *considered and may inspire the EIP implementation*?**

*The location of arable lands in a protected area, including special situation of land tenure and the relatively small size of holdings are factors that have favoured synergies among farmers. The most innovative aspect is the collaboration between farmers under the direction of a leader and the participation of the University. In addition, the project currently acts as an agroecological lighthouse and is visited by numerous farmers' associations from Spain and Europe.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

<http://www.espairuralgallecs.cat/>  
<http://www.aegallecs.cat/>  
<http://www.ub.edu/agroecologia>

**Contacts**

*Gemma Safont Artal, [gsafont@espairuralgallecs.cat](mailto:gsafont@espairuralgallecs.cat)*  
*F. Xavier Sans Serra, [fsans@ub.edu](mailto:fsans@ub.edu)*

## C8.

**Author:** *Inger Bertelsen*

### Kind of action described

- operational group (similar to..)
- demonstration activity
- training
- local applied research
- network
- other

### Topic area involved

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- climate change
- knowledge sharing
- other

### Brief description of the action:

*Breeding and testing varieties for better weed competition under organic farming conditions (spring wheat and spring barley). Our part is to make an index that makes it possible to assess a variety's ability to suppress weed and tolerate the presence of weed. The methods used must be low cost and reliable, so they can be used in the variety testing under organic conditions. Another task is screening of breeding material under organic conditions. Normally the selection of varieties is done only under conventional conditions, so now we are testing how organic screening can contribute to the selection. The goal is to have new varieties for the organic farming at the end of the project (2016).*

*All the trials are used for demonstration purpose, and farmers, advisers and all other interested in the topic are invited to see the trial.*

### Who are the actors involved?

*Knowledgecenter for Agriculture, Local trial units, University of Copenhagen, to Danish Breeding Companies (Sejet and Nordic Seed)*

### Who launched the initiative?

*Knowledgecenter for Agriculture, Sejet and Nordic Seed.*

### when did it start and end (if ended)?

*Started 1st December 2012 and ends 31st November 2016*

### Was it a success or a failure?

*Unknown – but the first year showed very promising breeding material for weed competition and yield.*

### Strong points for the success (partial or total)

*The interaction between advisors with long experience in organic farming and the best breeders primarily working with breeding for conventional farming.*

### Weak points (causing failure or a need for improvement)

*Weed competition is complex, and it might not be possible to find a sufficient reliable and cheap method for assessing the weed completion.*

**Can it be replicated and/or scaled-up?**

*Yes.*

**Which areas or farming systems can mainly benefit?**

*In this project the focus is on organic arable farms with a low nutrition input. In Denmark these farmers have the greatest difficulties finding appropriate varieties.*

**From the methodological point of view, is there something innovative in it that can be taken as example?**

## C9.

**Author:** Joan Romanyà

**Title:** *On farm characterisation of the on-going organic farming practices in Central Catalonia: an attempt to close the yield gap by spreading the best locally used practices.*

### Which kind of action is it?

*This action is a demonstration activity based on the analysis of the organic farming operations carried out by experienced organic farmers (with at least 10 years of experience) in a specific geographic area.*

*Organic farmers live fairly isolated one from another and normally have limited access to advisors. For this reason their farming practices are generally farmer specific and greatly vary from farm to farm. We have selected a series of 25 organic farmers to identify their farming practices (fertilisation, tilling and plant health treatments) and to determine their performance in terms of crop productivity and soil quality.*

### Key-words

*Crop production, soil quality, on-farm research, Mediterranean rain-fed arable systems, participative research*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- x nutrient management
- x soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- \* Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- x Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*This action consisted in identifying the most experienced organic farmers in an area of 100 x 100 km of extension and to learn from their experiences after analysing the agronomic performance and the soil quality of a selected control pilot field in every farm. As the farmers were fairly scattered over the land, we have been able to use their conventional neighbours as controls. We selected one pilot field in each farm and interviewed all farmers (both organic and conventional) to gather detailed information on the farming practices carried out in each field during the previous 10 years. This includes fertilisation, tilling, rotations, plant protection techniques, yields etc. Then we sampled the soils for analysis and measured crop and weed growth. With this information we were able to link the farming operations to the performance of each pilot field and identify, among the farming practices being used in the area, the best ones to optimise yields and soil quality at the field scale. Once the*

*information was gathered and organised, we participated in several meetings with farmers and advisors in order to diffuse the experience and the main results of this action.*

**Who are the actors involved?**

*Department of Agriculture of Catalonia, University of Barcelona, Spanish Research Ministry, 25 experienced organic farmers and the 25 conventional neighbors (conventional farmers).*

**Who launched the initiative? And when did it start/end?**

*The initiative was launched by the University of Barcelona in collaboration with the Department of Agriculture of Catalonia.*

**Was it a success or a failure?**

*It was a success. We could identify the best organic farming practices among those already in use in the area of study and disseminated the results to a certain extend.*

**Which are the strong points for the success (partial or total)**

*We identified the best organic farming practices, among those in use, to improve crop performance and soil quality. The use of composted manures was proven to provide high benefits in comparison to the use of slurries and fresh manures. Some organic farmers of the area were already aware of this fact. As a result, some others have started using compost since then. The initiative required the close collaboration of a significant number of farmers in the area.*

**Which are the weak points (for failure or for improvement)**

*The work was carried out only during one year. It would have been interesting to monitor the farming operations and its results in the years following this action..*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*This action could be replicated and extended to other farmers and areas. To monitor yields and soil changes occurring after organic farming conversion in some pilot farms/fields would be of great interest. Some local resources, either public or private, could be allocated to this purpose. This action could be also integrated to operational groups aiming to improve the organic farming practices and to fill the gap between organic and conventional farming. These operational groups would involve the organic residues industry, farmers, administration, scientists, organic farming regulation committee and urban stakeholders interested in organic food. To monitor the organic farming practices and its consequent yields and soil quality will highly contribute to optimiing the organic farming practices in the area and will definitely contribute to close or greatly reduce the yield gap.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Organic farmers in the area use composted manures of conventional origin. This practice along with the use of legumes in crop rotations has been proven to increase soil organic matter and N reserves. When the use of composted manures reaches an annual average of about 10 Tm/ha, organic crop productivity can be as high as that of conventional crops thus closing the yield gap between the two farming systems. Then we suggest that the potential benefits of compost and legumes should be incorporated into the organic farming practices of the rain-fed Mediterranean area.*

*For more details see:*

*Romanyà J.; Arco N.; Sola-Morales I.; Armengot L.; Sans F.X. 2012. Carbon and Nitrogen stocks and Nitrogen mineralisation in organically-managed soils amended with composted manures. Journal of Environmental Quality 41: 1337-1347.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

**Contacts**

*Joan Romanyà; Jromanya@ub.edu*

## C10.

**Author:** Joan Romanyà

**Title:** *ESPORUS. Center of conservation of local crop varieties*

### Which kind of action is it?

*Esporus is a centre of conservation of local crop varieties. ESPORUS aims to promote crop biodiversity. This diversity implies both landscapes and food supply.*

### Key-words

*Germplasm, local varieties, Training, seeds, biodiversity*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*The centre gathers a great number of germplasm of local varieties and they organise courses on how to cultivate them. ESPORUS is in touch with other seed networks for organic farming. They are part of the Spanish network of seeds.*

### Who are the actors involved?

*Association 'L'ERA' and the local school of agriculture (Dept. Agriculture)*

### Who launched the initiative? And when did it start/end?

*Local agricultural School of Manresa (Dept of Agriculture of Catalonia), Association L'ERA.*

### Was it a success or a failure?

*It is a success. They are regularly visited.*

### Which are the strong points for the success (partial or total)

*To keep the local varieties alive in the local landscapes and to enhance crop biodiversity. This has both cultural and ecological implications. They have a strong contact with the local farmers. They receive feedback from them. It is a small seedbank so they can survive with limited resources.*

**Which are the weak points (for failure or for improvement)**

*The number of farmers involved was too low. Lack of funding. Limited resources.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Yes it could be replicated in other areas in which there is a minimum number of farmers willing to cultivate local varieties.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*ESPORUS is self-sufficient although they are not economically sustainable. That is because they survive on voluntarism.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

*<http://www.esporus.org/>*

**Contacts**

*Esporus: Centre de conservació de la biodiversitat Cultivada. Can Poc Oli de l'Escola Agrària de Manresa.*

## C11.

**Author:** Joan Romanyà

**Title:** Training and dissemination for supporting the organic farming practices in central Catalonia

### Which kind of action is it?

*This is a centre called 'Association L'ERA' devoted to fostering organic farming practices in central Catalonia. It includes farmers as well as the food processing sector. They organise training courses, technical meetings for local farmers, publish a regular magazine (Agrocultura, 4 per year) and gather information relevant for organic farming at the local scale.*

### Key-words

*Organic farming, training, gathering of local farmers, dissemination,*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*The results of the action are: (1) the publication of a regular magazine (Agrocultura, 4 per year), (2) the organisation of technical meetings addressed to the organic farmers, (3) a permanent office to advise the farmers.*

### Who are the actors involved?

*Association 'L'ERA' and the local school of agriculture (Dept. Agriculture)*

### Who launched the initiative? And when did it start/end?

*Local agricultural School of Manresa (Dept of Agriculture of Catalonia), Association L'ERA.*

### Was it a success or a failure?

*It is a success. Slightly increasing number of visits.*

### Which are the strong points for the success (partial or total)

*The organisation represents a forum for the local organic farmers. Strong link with the territory nearby (Central Catalonia).*

**Which are the weak points (for failure or for improvement)**

*The number of farmers involved is too low. Weak connections with local Research centres and Universities. Reduced of funds allocated to the project (1.5 person months). They do not have answers to many of the questions of the farmers.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*It can only be replicated if there is a minimum number of farmers willing to be associated.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*The association brings together the organic farmers of a relatively wide local area. That means that their farms are nearby but not so near to know each other by other means. The association facilitates contact among organic farmers.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

<http://www.associaciolera.org/>

**Contacts**

*L'Era. Espai de Recursos Agroecològics. Av. Universitària, 4-6 (Edifici FUB) 08242-Manresa.*

## C12.

**Author:** *Dr. Johann Bachinger & Dr. Karin Stein-Bachinger, Leibniz Centre for Agricultural Landscape Research (ZALF)*

**Title:** *BERAS (Baltic Ecological Recycling Agriculture and Society) Implementation*

### Which kind of action is it?

*Because of its transnational structure including different regional and national initiatives of networks (Scientists, farmers, farmers' associations, consumer associations and municipalities). Demonstration activity through a network of 24 BERAS information centres (organic livestock farms) in nine countries within the catchment area of the Baltic Sea.*

### Key-words

*Nutrient recycling, Baltic Sea, whole food chain*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- x nutrient management
- x soil management
- variety choice
- x pest and disease management
- x weed management
- x system resilience
- x knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Protection of the Baltic Sea through a systemic shift to Ecological Recycling Agriculture (ERA) in connection with the whole food chain from farmer to consumer: Guiding farmers converting to (ERA); providing education for schools, universities and farmers; raising awareness and creating market opportunities for ERA products through Diet for a Clean Baltic; making policy recommendations for conversion to ERA; contributing to scientific assessments of environmental, economic and social impacts of Sustainable Food Societies. The website [www.beras.eu](http://www.beras.eu) offers a whole range of education and information materials to protect the Baltic Sea. Guidelines for farmers and advisors help to practice and develop ERA.*

### Who are the actors involved?

*24 partners from 9 countries around the Baltic Sea (agricultural advisors, farmers, researchers, local authorities, food chain actors, ministries, regional and local governments)*

### Who launched the initiative? And when did it start/end?

*Södertörn University Sweden and The Biodynamic Research Institute, Sweden*

*Part-funded by EU (Baltic Sea Region Programme)  
2010 - 2013*

**Was it a success or a failure?**

*Successful on-going transnational network of different stakeholders around the Baltic Sea.  
Cooperation with (i) Dominican Republic for the protection of Gulf of Mexico, and (ii) India.*

**Which are the strong points for the success (partial or total)**

*Establishing a network of ERA farms and 20 BERAS information centres around the Baltic Sea.  
Building the BERAS International Network after the project end  
Implementing Diet for a Clean Baltic – Diet for a Green Planet in the future*

**Which are the weak points (for failure or for improvement)**

*Unsecure funding for ongoing activities and regional adaptation of the software tools after the end of the project.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment" / farming system / socio-economic conditions?**

*In principle it can be replicated all over Europe from the regional up to the transnational level.*

**From the methodological point of view is there something innovative in it that can be taken as example?** Some innovative elements that you think should be considered and may inspire the EIP implementation?

*The creation of a network of BERAS information centres, mainly on ERA farms as learning centres.  
Participation of all stakeholders in the food chain.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

*[www.beras.eu](http://www.beras.eu)*

**Contacts**

## C13.

**Author:** *Dr. Johann Bachinger & Ralf Bloch, Leibniz Centre for Agricultural Landscape Research (ZALF)*

**Title:** *Adaption tools for climate adaption in Organic Farming - Sub project of the Innovation Network for Climate Change Adaptation Brandenburg Berlin ([www.inka-bb.de](http://www.inka-bb.de))*

### Which kind of action is it?

*Through (i) the underlying participatory approach, (ii) the combination of plot experiments and on farm trails and (iii) the established innovation network including farmers, advisors and scientist the project is similar to an operational group including demonstration activities.*

### Key-words

*Climate adaption, action research, reduced tillage, on-farm research, cropping system, organic farming*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- X nutrient management
- X soil management
  - variety choice
  - pest and disease management
- X weed management
  - system resilience
  - knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- x Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Innovation networks like INKA BB can play an important role in improving the regional adaptive capacity to climate change. The INKA BB's action research approach corresponds to the challenges of co-working of scientists and organic farmers on 'real-farm' problems, developing innovative solutions for adapting their farming systems to climate change, and incorporating them in new action strategies. Therefore after regional and farm specific SWOT analyses, six on-farm experiments were implemented and complemented with closely linked plot experiments at the experimental station of ZALF. One main objective of the research action was the transdisciplinary pooling of knowledge from different partners (scientists, advisors & farmers) in a process of innovation generation and learning.*

### Who are the actors involved?

*Organic farmers, advisors from the organic farming associations Bioland, Demeter, and Naturland and scientists from the Leibniz-Centre for Agricultural Landscape Research (ZALF) and the University of Sustainable Development Eberswalde (HNEE)*

**Who launched the initiative? And when did it start/end?**

*Organic farmers, advisors from the organic farming associations Bioland, Demeter, and Naturland and scientists from the Leibniz-Centre for Agricultural Landscape Research (ZALF) and the University of Sustainable Development Eberswalde (HNEE)  
2009-2014*

**Was it a success or a failure?**

*Successful and still ongoing, a current project concerning the improvement of grain legume cultivation in the federal state of Brandenburg*

**Which are the strong points for the success (partial or total)**

*Technical and social innovations were developed during a collective learning process. Project could be based on an already viable transdisciplinary network.*

**Which are the weak points (for failure or for improvement)**

*The working process was very communication intensive. The scientific output is relatively low compared to more basic research. The establishment of a viable transdisciplinary network needs a period of several years.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*The action research approach of INKA BB can be repeated anywhere, but as already mentioned particularly fostered by an established transdisciplinary network. Additional funds are needed to finance on-farm experiments within the first years.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*The combination of participatory action research with on-farm experiments closely linked small-plot experiments was a new method, which was suitable (i) as a basis for developing farm and regional specific adaptation measures and (ii) for a complex vulnerability analysis of farming systems*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

[www.inka-bb.de](http://www.inka-bb.de); [www.klima-bob.de](http://www.klima-bob.de)

**Contacts**

*Dr. Johann Bachinger; [jbachinger@zalf.de](mailto:jbachinger@zalf.de)*

## C14.

**Author:** Arja Nykänen, ProAgria, Finland (via FG expert Aira Sevon)

**Title:** Research co-operation between researchers and advisors (LUTUNE)

### Which kind of action is it?

*This activity can be considered mainly similar to an operational group.*

### Key-words

*co-operation, network, researcher, advisor, on-farm research, organic farming*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*The aim of the activity is to advance the co-operation between advisors, researchers and farmers. First the information or knowledge gaps were identified in the discussions of researchers and advisors. Then the needed info was gathered from the literature. If the info was not available, on-farm research was done and there the co-operation between all three action groups was made.*

### Who are the actors involved?

*Researchers of MTT Agrifood Research Finland, organic advisors of ProAgria Rural Development Services and farmers all over Finland.*

### Who launched the initiative? And when did it start/end?

*MTT and ProAgria together*

### Was it a success or a failure?

*It was a success, since we really could make several actions together and benefit the whole organic farming sector via knowledge gain. Researchers got valuable information of the reality of organic farming.*

### Which are the strong points for the success (partial or total)

*Regular webinars between actors in doing on-farm experiments. Blog writing*

**Which are the weak points (for failure or for improvement)**

*Loose contact between actors when the action was to make a literature review.  
The results could be spread better some how.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Yes. We have plans to study cereal varieties this year by on-farm experiments with the same kind of structure. It can be replicated in any agricultural environment where co-operation between actors of different sectors is wanted.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Regular webinars to meet were essential for this project success.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

-

**Contacts**

*Arja Nykänen arja.nykanen@proagria.fi*

## C15.

**Author:** Luisa Manici, Consiglio per la Ricerca e la sperimentazione in Agricoltura (CRA) Bologna, Italy

**Title:** An action model for developing new technical options in organic farming and transferring knowledge.

### Which kind of action is it?

*This case can represent a model to optimise a method aiming at solving one of the many technical needs existing in organic farming. It begins from a rigorous research activity focused on a specific problem of organic fruit tree producers in a specialised apple growing area, it continues with an effective dissemination plan for transferring knowledge at different relevant levels. This, to support consequent actions which can range from developing new techniques by farmers, up to adoption at national scale of new rules or specific actions supporting the fruit tree-growing regions.*

### Key-words

*Multidisciplinary research; replant problems; dissemination strategy, organic farming*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- X soil management
- variety choice
- X pest and disease management
- weed management
- system resilience
- X knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- X Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*The action focused on an important apple growing area (South Tyrol) and referred to several private farms identified as having replant problems within the network of a Regional research centre (<http://www.laimburg.it/en/default.asp>).*

*It begun from the following items: (1) needs of farmers; (2) environmental and social constrains of an agro-forest environment specialized in apple production.*

*Research activity was based on (3) plant growth tests on native soil samples, to provide responses easy to disseminate and (4) then it was enriched with additional activities to elucidate biological components involved ion plant response in land affected by replant problems, responsible of crop yield decline.*

### Who are the actors involved?

- i) Regional Research station working with a large network of farmers .
- ii) Researchers

**Who launched the initiative? And when did it start/end?**

*CRA with the financial support of MiPAAF, Italian Ministry of Agriculture, Food and Forest, within a project on Organic Agriculture ( acronym: ENDOBIOFRUT )*

**Which are the strong points for the success (partial or total)**

*The total success of this action derives from clear information provided to farmers about the impact of a specific agro-technique (effectiveness of replanting new orchards on strip rows) for reducing yield losses caused by replant disease in multigeneration apple orchards.*

**Which are the weak points (for failure or for improvement)**

*These types of projects with limited budgets are suitable to solve specific issues. A higher available budget and larger participation (inter-regional) could have allowed to further extend this research experience to other fruit tree growing regions of northern Italy .*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*This format can be scaled-up both to national and European level (it has been actually transferred to a transnational project of Coreo rganic 2 call ([www.coreorgani2.org](http://www.coreorgani2.org)), BIO-INCROP project. It can also be applied to any other crop (both woody and herbaceous) grown in specialising areas.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*From the methodological point of view, the innovations of this action are:*

- *MULTIDISCIPLINARY SCIENTIFIC APPROACH* of research
- *Close COOPERATION BETWEEN LOCAL RESEARCH centre, in close relation with apple producers, and NATIONAL RESEARCH organisation.*
- *EFFECTIVE DISSEMINATION PLAN* oriented toward different relevant stakeholders. Thus dissemination tools ranged from: i) **scientific journals**, such as for example that entitled: *Planting in the 'inter-row' to overcome replant disease in apple orchards: a study on the effectiveness of the practice based on microbial indicators. Published in 2012 on Plant and Soil 357:381-393. Available on <http://link.springer.com/article/10.1007%2Fs11104-012-1172-0> , to ii) **local technical bulletins** such as *Das Phänomen vom müden Boden. Der Sudtiroler Landwirt (2013) 67: (6) 67-68*; up to iii) **national technical magazines** , such as that entitled: *Prove di sostituzione del terreno per il reimpianto del melo. Rivista di Frutticoltura e di ortofloricoltura (2013), 75(3), 46-48.**

*Findings were also transferred through open day or field visits for the stakeholders at the Regional Research Centre in South Tyrol.*

*In conclusion, dissemination was performed, without changing main contents and goals, but simply adapting the ways of presentation according to the different audiences.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

<http://www.sinab.it/ricerche/all/all?title=ENDOBIOFRUT>

**Contacts**

*Markus Kelderer - Research Centre for Agriculture and Forestry Laimburg, Ora/Auer (BZ) – ITALY e-mail: **Markus.kelderer@provinz.bz.it***

*Luisa Manici - Consiglio per la ricerca e sperimentazione in agricoltura, Bologna Italy e-mail: **luisa.manici@entecra.it***

## C16.

**Author:** Marco Locatelli – Farmer – Manager of Tuscany Regional Lands

**Title:** Protection and development of genetic heritage for conservation of rural biodiversity

### Which kind of action is it?

*The practical case "Protection and development of genetic heritage for conservation of rural biodiversity" this was a real opportunity for all Tuscany farmers. This is a part of Tuscany's Rural programme isn't destined only for organic farmers, but this action is open to all the farmers. This action is a real help to keep the incredible biodiversity of the Tuscany Region and its typical landscape.*

### Key-words

*keeper farmer  
genetic heritage  
conservation  
development*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

*This action affects particularly the variety choice and the knowledge sharing. The farmers use the old varieties and so the genetic heritage is actively conserved. Furthermore with the support of the Tuscany Region the farmers can take part in a workshop to share knowledge in the biodiversity sector.*

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Since 2004 the Tuscany Region supports the conservation of the plants' old varieties (cereals and vegetables) coming from the Tuscany area (Regional Law n. 64/2004). The farmers can ask to cultivate old varieties and become "keeper farmer". They can use a logo for increasing the value of the product. There are also the "Old varieties' banks" where some organisations (especially public organisations, i.e. University) conserve the seeds into fridges and verify the germination level. These banks return to "keeper farmer" small quantities of seeds. The Tuscany Region, through the public authority "Tuscany Regional Lands" supervises the bank and the "Keeper farmers" and their cultivated land. When all is done according the rules, the "Tuscany Regionale Lands" can give a little subsidy for*

*each variety. This system preserves actively the genetic heritage keeping it alive and productive and at the same time it is a new economic opportunity especially for little organic farms.*

**Who are the actors involved?**

*This is a horizontal action because it includes farmers, public authority, advisors, researchers and experimental farms. It is a system to conserving the important Tuscany biodiversity*

**Who launched the initiative? And when did it start/end?**

*In 2004 the Tuscany law n. 64 launched this action and now it is active thanks to the support of Regional Rural development programme with the help of EU resources.*

**Was it a success or a failure?**

*It was a great success. There are now over one hundred "keeper farmers" and the admission requests are increasing.*

**Which are the strong points for the success (partial or total)**

*Now this action is open to all farmers that ask to enter in the system and commit to cultivating old varieties. The fund is available and well balanced regarding the number of farmers admitted.*

**Which are the weak points (for failure or for improvement)**

*Unfortunately this action is too bureaucratic. Too many papers for a little subsidy. So we hope in the future the fund will increase because more and more farmers are interested in project about biodiversity.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*It is easy to replicate this project in other EU Regions so long as Old varieties' banks exist and work. Similar actions are already active in EU (in Italy: Piedmont Region).*

**From the methodological point of view is there something innovative in it that can be taken as example?**

*I think that the most innovative element is that this action allows farmers to enter in a system where they can share their experiences each other. They can also take active part in workshops and sector fairs.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

*This is the web site: <http://germoplasma.arsia.toscana.it/Germo/>.*

**Contacts**

*Marco Locatelli [direttore@alberese.com](mailto:direttore@alberese.com)*

## C17.

**Author:** Maria Wivstad

**Title:** Precision farming in organic production – more efficient weed and fertiliser management for increased productivity

### Which kind of action is it?

*It is a participatory research group with several aims; i) to initiate on-farm research and ii) to share and implement existing knowledge and experiences. Demonstrations activities are also included to spread knowledge and results from the work by the group.*

### Key-words

*Participatory research, mechanical weeding, cereal productivity, knowledge sharing, organic farming*

### Which of “our” topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*A group, sharing ideas for new solutions, experiences and knowledge, was formed with a number of different stakeholders. The overall aim was to improve weed and nutrient management on stockless organic farms in the southern plains of Sweden. Besides knowledge sharing, one objective was to initiate participatory research projects on mechanical weeding and timing of application of differing organic fertilisers, both on-farm manure and off-farm organic fertilisers, e.g. rest products from the food industry.*

*Workshops have been arranged on the participating organic farms including field visits and demonstrations of weeding operations, testing of new weeding machinery, techniques for spreading of fertilisers etc. Public field demonstrations have been conducted to spread the group’s experiences to a wider audience, e.g. farmers and advisors.*

*Applications for funding of on-farm trials have been written. Two projects have been funded so far: i) technique and timing of mechanical weed control in organic cereals and pulse crops, ii) spreading techniques and timing of fertilisation to cereal nutrient needs. The projects have a participatory approach involving the whole group.*

### Who are the actors involved?

*3 farmers, 3 researchers, 1 farm machinery entrepreneur*

*(<http://www.gothiaredskap.se/index.php?lang=en>), 1 advisor*

**Who launched the initiative? And when did it start/end?**

*The advisor*

**Was it a success or a failure?**

*A success. Farm management practices have been developed on the actual farms, as well as spread to others. Innovative weeding techniques have been developed.*

**Which are the strong points for the success (partial or total)**

*Common goals, a combination of theoretical and practical knowledge and skills. Everyone could contribute, everyone could benefit.*

**Which are the weak points (for failure or for improvement)**

*Lack of funds for the members in the group. Consequently the participants had difficulties to find possibilities to dedicate time for this work. This could be solved by creating an operational group possibly funded by the national rural programme and/or thematic networks within Horizon 2020.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Yes. Similar groups could take this example into action. The knowledge gained in the group has been communicated on Farmers' Days and field demonstrations. This way to develop research ideas, in a group of stakeholders, could be replicated.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Initial agreement of engagement on equal terms. Participatory methods were used to identify problems, solutions and actions. It was valuable to involve a local machine entrepreneur. To bring in new ideas and knowledge into the group, the initiation of common research projects are important. Valuable also to have researchers willing to be responsible for writing proposals and letting in stakeholders in that process.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

**Contacts**

*Maria.Wivstad@slu.se*

## C18.

**Author:** Miguel Brito

**Title:** Crop fertilisation in organic farming and evaluation of the post-harvest products

### Which kind of action is it?

*Project with local applied research, demonstration activities and knowledge sharing about soil fertility, composting, nitrogen fertilisation and evaluation of post-harvest products for organic vegetable production.*

### Key-words

Soil fertility  
Composting  
Nitrogen management  
Vegetable production  
Post-harvest quality  
Organic farming

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Evaluation of compost nitrogen mineralisation rates in the soil, in order to identify technical, economic and ecological criteria to optimise nitrogen fertilisation in organic vegetable production. Evaluation of the use of different compost rates applied to soil at different times, in order to match nitrogen mineralisation with crop demand. Improvement of soil organic fertility by crop rotation, crop residues, green manures, animal manures, nitrogen fixation in pastures and legumes, as well as the use of composts and other organic fertilisers as soil amendments.*

*This project contributed to the knowledge about organic crop fertilisation and composting for organic agriculture and for the demonstration of production techniques for vegetable crops organically grown. It was edited an Organic Vegetable Production Guide whereas a network between researchers, advisers, students and farmers allowed knowledge sharing during the project and beyond.*

### Who are the actors involved?

*University/Polytechnic (5), Ministry of Agriculture, Cooperatives of Agriculture (4).  
Researchers, advisers and farmers.*

**Who launched the initiative? And when did it start/end?**

*High School of Agriculture of Ponte de Lima of the Polytechnic of Viana do Castelo, Portugal Project AGRO 794, funded by UE and the Portuguese Institute for Agricultural Research*

**Was it a success or a failure?**

*It was innovative and successful.*

**Which are the strong points for the success (partial or total)**

*Contribute to the knowledge and demonstration of production techniques for organically grown vegetable crops, namely in the region of NW Portugal.  
Elaboration of an Organic Vegetable Production Guide.*

**Which are the weak points (for failure or for improvement)**

*Maximum of 4 years for project funding (2004-2007).*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*It can be replicated with adaptations, particularly for small-farm organic vegetable production.*

**From the methodological point of view is there something innovative in it that can be taken as example?**

*Participation of farmers, agricultural technicians, advisors, researchers and students, in local visits, seminars, meetings, Internet chats, journals and other publications.  
Partners' involvement in project results dissemination.  
Field experiments carried out both in public institutions and in private companies.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

**Contacts**

*Luis Miguel Brito (miguelbrito@esa.ipvc.pt)*

## C19.

**Author:** Jozef Tyburski

**Title:** *Introduction of organic soybean growing to Central Europe*

### Which kind of action is it?

*It can be considered both as on-farm research and demonstration activity, although it could (or even should) be easily taken by an operational group.*

### Key-words

*protein crops, soybean, organic farming, Central Europe, adaptation to climate change*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice (*new soybean varieties and climate warming enabled soybean growing in Central Europe*)
- pest and disease management
- weed management
- system resilience (*the idea of introduction of soybean is to replace lupines, which in last years fail due to spread of anthracnose (*Gloesporium* sp.) and in the same time to adapt to climate change*)
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*The idea of replacement of lupines by soybean is caused by two main reasons:*

*1/ the spread of anthracnose (*Gloesporium* sp.), so lupine seed yields dropped from 1.5-2.5 t per ha to 0.3-1.0 t per ha, and on light sandy soils (very common in Central Europe) it is impossible to grow peas or horse beans;*

*2/ the warmer climate and the new soybean varieties made it possible to grow soybean in Central Europe. The crop is resistant to most of diseases and is capable to survive periods of droughts. On sandy soils one can obtain 2 t per ha of soybean and on better soils yields are higher – 3-4 t per ha.*

*Organic framers in Poland are adopting growing of the new crop quickly. It not only gives good yields but also (thanks to inter-row cultivation) is markedly reducing weed infestation (including perennials). Moreover soybean is a good preceding crop for cereals raising the grain yields by 40-70%.*

*Farmers from the neighborhood are eager to visit demonstration plantations and spreading of organic soybean growing is currently being done mainly by direct contact between farmers. The next step could/should be to create an operational group (including a professional adviser or facilitator).*

**Who are the actors involved?**

*Researches from the University of Warmia and Mazury in Olsztyn,  
Agricultural Extension Service in Gadansk  
Organic farmers – J. Plotta and A. Michalkiewicz, on which fields' demonstration and training activity takes place.*

**Who launched the initiative? And when did it start/end?**

*Researcher from the University of Warmia and Mazury in Olsztyn  
Although first attempts started in 1998, the real field scale project started in 2012, and will be ended in 2014. Then a follow up by operational group would be welcomed.*

**Was it a success or a failure?**

*It was a success. Many farmers both from the neighborhood and from other regions have taken up the idea of soybean growing.*

**Which are the strong points for the success (partial or total)**

*We have found a pulse crop that can replace lupine. An additional advantage is that in soybean one can control weeds (inter-row cultivation) during crop vegetation. Moreover yields of cereals following soybean has increased by ca. 40-70% (as compared to cereals growing after non-legumes).*

**Which are the weak points (for failure or for improvement)**

*There is a need to create an infrastructure in the countryside for soybean thermal treatment. The level of anti-feeding substances in soybean seeds is so high that farmers must not feed them raw. There is a need to follow up by operational group to achieve a country/region-wide introduction of the new crop.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*It can be both replicated and scaled up. The interest of farmers is so high, that area of soybean growing is rapidly expanding.*

*There are two main conditions for successful scaling up:*

- *creation an infrastructure in the countryside for soybean thermal treatment (it can be done in a mobile form)*
- *creation of an operational group for spreading the new way of achieving on-farm protein self-sufficiency in the country or region.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Introduction of a new crop which enables mixed organic farmer to become protein self-sufficient. Due to high oil content in the soybean seeds, energy deficiency in animal diet can be solved. Grain maize offers a possibility of improving efficiency of weed control (at low costs).*

*The above elements are innovative and are worthy of implementation.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

-

**Contacts**

[Jozef.tyburski@uwm.edu.pl](mailto:Jozef.tyburski@uwm.edu.pl)

## C20.

**Author:** Jozef Tyburski

**Title:** *Grain maize growing in organic farms in northern Poland*

### Which kind of action is it?

*It can be considered both as on-farm research and demonstration activity, although it could be easily taken up by an operational group.*

### Key-words

*Fodder cereals, yield gap, grain maize, northern Poland, adaptation to climate change*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- x nutrient management
- soil management
- variety choice (*new maize varieties and climate warming enabled grain maize growing in Central Europe*)
- pest and disease management
- x weed management
- x system resilience (*introduction of grain maize growing can be seen as system resilience via adaptation to climate change*)
- x knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*As traditionally grown cereals (wheat, rye, oats, barley, triticale) are yielding very low on sandy soil (growing water shortages, growing temperatures, bad FYM utilisation) more and more organic farmers were close to bankruptcy. Maize responds positively to higher temperatures and is more resistant to periodical water shortages. Frequent inter-row cultivation enhances the mineralisation rate of FYM (and/or green manures and crop residues) and thus speeds up maize growth. Another advantage is that maize can be grown on low quality sandy soils of 25-30 points (in a 100 point scale). The yields of maize grain are rather high – 7-9 t per ha, while on the same soil one can expect 2-3 t per ha of grain of traditionally grown cereals. Before climate warming and the breeding of new maize varieties adapted to Central European climate, this would not be possible.*

*Farmers from the neighbourhood are eager to visit demonstration plantations. They start organic grain maize growing. Dissemination is currently being done mainly by direct contact between farmers. The next step should be creation of an operational group (including a professional adviser or facilitator).*

### Who are the actors involved?

*Researches from the University of Warmia and Mazury in Olsztyn  
Agricultural Extension Service in Gdansk*

*A group of organic farmers in northern Poland*

**Who launched the initiative? And when did it start/end?**

*Researcher from the University of Warmia and Mazury in Olsztyn.  
It started in spring 2012, and will be ended in 2014. Then a follow up by operational group would be welcomed.*

**Was it a success or a failure?**

*It was a success.*

**Which are the strong points for the success (partial or total)**

*Increase of grain yield on low quality sandy soil (3-4 times) in comparison to traditionally grown cereals. One can control weeds for a longer period during crop vegetation (especially perennials).*

**Which are the weak points (for failure or for improvement)**

*There is a need for investment in adaptation of combine harvesters to grain maize harvest. There is weak infrastructure in the countryside for maize grain drying (most of farms are not equipped with dryers, and during harvest grain has 22-35% of moisture content).*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*It can be both replicated and scaled up. The interest of farmers is high, so the area of grain maize growing is expanding.*

*There are two main conditions for successful scaling up:*

- *creation of infrastructure in the countryside for grain maize drying (it can be done in a mobile form)*
- *creation of operational group for spreading the new way of achieving on-farm grain self-sufficiency by mixed farms, in the country or region*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*Introduction of a new crop which enables organic farmers to overcome a yield gap in fodder cereals and become self-sufficient in grain fodder. Important is also improved efficiency of weed control (at low costs) – thanks to inter-row cultivation.*

*The above elements are innovating and are worth of implementation.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

-

**Contacts**

*[Jozef.tyburnski@uwm.edu.pl](mailto:Jozef.tyburnski@uwm.edu.pl)*

## C21.

**Author:** *Dr Ulrich Schmutz, Garden Organic & Coventry University, UK (thanks to [www.organicweeds.org.uk](http://www.organicweeds.org.uk))*

### Kind of action described

- operational group (similar to..)
- demonstration activity
- training
- local applied research
- network
- other

### Topic area involved

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- climate change
- knowledge sharing
- other

### Brief description of the action:

*Participatory investigation of the management of weeds in organic production systems (DEFRA funded). Participatory 4-year research project with UK organic (but also conventional) arable and livestock farmers.*

*[www.organicweeds.org.uk](http://www.organicweeds.org.uk)*

*The project ended in 2004 but the website and information-sharing is still on-going with regular use not only in the UK*

*The website [www.organicweeds.org.uk](http://www.organicweeds.org.uk) aims to be a primary resource on weed management for organic farms, reporting on the latest weed information, weeding techniques and weed research. It aims to act as a focal point for farmers, growers, advisors and researchers to share their experiences with weeds.*

### Who are the actors involved?

*Farmers (arable, livestock and horticulture), advisors and researchers*

### Who launched the initiative?

*Defra, Ministry of Agriculture in UK and then carried by research charity Garden Organic £400k funding*

**When did it start and end (if ended)?**

*2002-2006 with on-going use*

**Was it a success or a failure?**

*Successful and still on-going 8 years after project finished*

**Strong points for the success (partial or total)**

*Participatory interaction and website*

**Weak points (causing failure or a need for improvement)**

*Funding only for 4 years and failure to secure further funding over the years*

**Can it be replicated and/or scaled-up?**

*Yes can be EU wide*

**Which areas or farming systems can mainly benefit?**

*All with field crops and weeds: arable, grassland, vegetable, orchards*

**From the methodological point of view, is there something innovative in it that can be taken as example?**

*The participation and sharing of weed control case studies.*

## C22.

**Author:** *Dr Ulrich Schmutz, Garden Organic & Coventry University, UK (thanks to [www.farmcarbontoolkit.org.uk/carbon-calculator](http://www.farmcarbontoolkit.org.uk/carbon-calculator))*

### Kind of action described

- operational group (similar to..)
- demonstration activity
- training
- local applied research
- network
- other                      please specify: online calculation toolkit

### Topic area involved

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- climate change
- knowledge sharing
- other                      please explain: eco-efficiency and recourse use reduction

### Brief description of the action:

*Tailored Carbon calculators are an essential way of measuring the amount of carbon generated by farming and growing businesses, and the carbon absorbed by the soil and biomass on the land. The Farm Carbon Calculator is one of the most comprehensive, accurate and user friendly carbon calculators available to farmers and growers. Version 3.0 is fully updated and includes new features such as agro chemicals, waste and a new easier-to-use distribution section. There is a unique 'Carbon Visualisation feature' and clear, easy to understand results.*

### Who are the actors involved?

*Farmers (arable, livestock and horticulture), advisors and researchers (organic and conventional)*

### Who launched the initiative?

*Two organic farmers Adam Twine and Jonathan Smith  
(and supported by other farmers and organic charities like Garden Organic and Soil Association)*

### When did it start and end (if ended)?

*2009 with ongoing use, updated website and latest version done 2013*

### Was it a success or a failure?

*Successful and still ongoing*

### Strong points for the success (partial or total)

*Online tool but also participatory seminars and training*

### Weak points (causing failure or a need for improvement)

*Funded with small budget (from windpark electricity output)*

### Can it be replicated and/or scaled-up?

*Yes can be used EU wide for farmers to become more eco-efficient and cut carbon emissions (also*

*useable to monitor carbon offsetting)*

**Which areas or farming systems can mainly benefit?**

*All arable, livestock, grassland, vegetable, orchards, glasshouses, urban horticulture, farm procession and energy production*

**From the methodological point of view, is there something innovative in it that can be taken as example?**

*Funding from feed-in tariff on farm energy production, participation and sharing of carbon reduction case studies.*

## C23.

**Author:** *Véronique Chable*

**Title:** *PaysBlé: On-farm research to improve performance of organic wheat for traditional bread in Brittany*

### Which kind of action is it?

*A group of farmers-bakers in the western part of France has created an association to manage their own research for plant breeding, seed conservation, cultivated biodiversity and sharing knowledge about traditional baking with natural sourdough. They aimed to improve performance of local landraces, to adapt their crop and bakery practices, in collaboration with researchers and involving consumers for organic agriculture and local market.*

### Key-words

*Organic wheat, traditional bread, crop performance, participatory plant breeding, crop diversity*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Soft wheat was one the first species for which organic farmers initiated on-farm breeding and seed conservation in order to answer their specific objectives from Breton traditional landraces: qualities for traditional baking, robustness and stability of yields for the crop.*

*For about 10 years, farmer-bakers (farmers who make bread on the farm from their harvested wheat) have developed, with researchers, several breeding strategies and methodologies to measure environmental interaction and qualities (nutritional and sensorial). By the means of regional funding (2009-2012) and European project (SOLIBAM, 2010-2014), on farm experiments integrated the knowledge and know-how of different actors (farmers, millers, bakers, researchers) and different disciplines (soil life, agronomy, pathology, microbiology, science of bakery...) to better manage on-farm breeding and to better evaluate its impact on crop performance and bread quality.*

*For experimental baking, the farmer-bakers and bakers, with researchers, have completed a "tool" for evaluation for each step of their baking process. Then with consumers, tendency on the relative impact of genetics and environmental aspects on taste have been highlighted. Genetics factors impact more taste characteristics than environmental ones which seems to influence more the textural criteria. The process is still on-going and the number of farmers is still increasing,*

*diversifying the breeding objectives.*

**Who are the actors involved?**

*Farmers, bakers, researchers and consumers involved in this participatory experiment are members of the association Triptolème, which works on cultivated diversity. This association is one the members of Réseau Semences Paysannes.*

**Who launched the initiative? And when did it start/end?**

*At the end of the 90s some farmer-bakers who were rediscovering traditional bakery (with natural sourdough) were looking for wheat adapted to this practices as modern wheat had been bred for industrial bakery based on yeast. With the help of few researchers, local landraces conserved in gene banks were trialed and cultivated again. The actors created seed association which is named Triptolème in the West part of France.*

**Was it a success or a failure?**

*New breeding methods for diversity but "time" is often missing for farmers so as to develop the activity as far they wish – Awareness of several kinds of actors for bread quality*

**Which are the strong points for the success (partial or total)**

*One of the strong results is the common organisation of research involving diversified actors with several kinds of knowledge. Nevertheless, this organisation needs to be continuously improved as the number of actors rises so as to preserve a high level of confidence*

**Which are the weak points (for failure or for improvement)**

*Financial means are not sufficient to maintain "facilitator" job in seed associations like Triptolème. Their help is fundamental to organise the on-farm research and to reinforce the networking activities. Their position depends on projects with time-limited funding.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*The Breton experience has already been scaled-up in other French regions. The Réseau Semences Paysannes has about 10 "seed associations" involved in plant breeding and bread quality for wheat. The organisation and the objectives can be different in each of them since the local landraces and bakery processes may vary according the cultural context.*

*Other associations are organised for other species with the same objectives to increase performance and quality of the products, involving local actors. The same limit is encountered by all groups: means to finance "facilitators" position so as to maintain competences and disseminate knowledge within the group, to manage experiments and to communicate to a broader scale.*

**From the methodological point of view is there something innovative in it that can be taken as example? Some innovative elements that you think should be considered and may inspire the EIP implementation?**

*These experiences are stimulating several methodological innovations to better understand the farming systems and to support knowledge sharing. The group (farmers, researchers, and other local actors) have developed several methods of quality evaluation, mainly for sensorial evaluations of the produce on farm and bakery considering at the same time the agronomical objectives; therefore, we have also tested management of participatory research for complex questions.*

*The most innovative elements is the creation of "seed association" are collecting collective means, organising experiments, making links between farmers, bakers, traders, consumers, researchers ..., and disseminating results and information, but it is the weak link of the system. EIP implementation should reinforce this organisation, providing means to increase their stability, since they could be the innovative component of an Operational group, with the new kind of job: "facilitator".*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

<http://www.rennes.inra.fr/Toutes-les-actualites/Agriculture-biologique-Un-nouvel-avenir-pour-les-bles-de-pays>

<http://sciencescitoyennes.org/wp-content/uploads/2013/07/fiche-PaysBI%C3%A9.pdf>

[http://www.semencespaysannes.org/triptoleme\\_286.php](http://www.semencespaysannes.org/triptoleme_286.php)

[http://www.semencespaysannes.org/selection\\_participative\\_tour\\_horizon\\_experien\\_125.php](http://www.semencespaysannes.org/selection_participative_tour_horizon_experien_125.php)

[http://www.semencespaysannes.org/cereales\\_anciennes\\_boulangerie\\_paysanne\\_group\\_45.php](http://www.semencespaysannes.org/cereales_anciennes_boulangerie_paysanne_group_45.php)

**Contacts**

*Veronique Chable – [chable@rennes.inra.fr](mailto:chable@rennes.inra.fr)*

*Association Triptolème - [tripto@laposte.net](mailto:tripto@laposte.net)*

## C24.

**Author:** *Wijnand Sukkel*

### Kind of action described

x operational group (similar to..)  
x demonstration activity  
x training  
x local applied research  
x network  
x other please specify: actually the project called BIOM was all of these aspects in one, even used for political lobby

### Topic area involved

X nutrient management  
X soil management  
x variety choice  
x pest and disease management  
x weed management  
x climate change  
x knowledge sharing  
x other please explain: again all in one, as all these topics are related we used an integral farminf systems approach that combined all these topics

### Brief description of the action:

*Project called BIOM with a combination of on-farm research and knowledge circulation, participatory learning etc. Basis was intensive farm data registration, regional groups meetings, cooperation of farmers, advisers and researchers. The project lasted 7 years between 1998 and 2005. The project had great impact on knowledge and craftsmanship of farmers and on the farm performance in agronomic as well as in environmental terms.  
The project was focused on arable and open field vegetable production.*

### Who are the actors involved?

*Basically about 80 organic farmers and farmers in conversion to organic agriculture, advisors (in conversion), and researchers. Depending on the type of meeting also suppliers, wholesalers and policymakers were involved.*

### Who launched the initiative?

*Research in close cooperation with policy*

### when did it start and end (if ended)?

*1998 - 2006*

### Was it a success or a failure?

*succes*

### Strong points for the success (partial or total)

*Strong interaction between research advice and research. Farmers indicated that they appreciated the most the contacts among farmers and the mutual group farm visits.*

### Weak points (causing failure or a need for improvement)

*Project costs*

**Can it be replicated and/or scaled-up?**

*Scaling up was partly included in the project and partly realised by intensive communication*

**Which areas or farming systems can mainly benefit?**

**From the methodological point of view, is there something innovative in it that can be taken as example?**

*Cooperation between farmers, extension and research are used more. However working nationwide with a very large number of farmers was new.*

## C25.

**Authors:** L. Hazard, F. Rey, V. Chable, S. Bellon

**Title:** *Community-based management of cultivated biodiversity (Sainfoin): an initiative on forage crops by producers of AVEM (Roquefort area, France)*

### Which kind of action is it?

*The case is about the experience of 150 Roquefort farmers engaged in improving forage crops quality and production, with the help of researchers and veterinarians. The aim is to improve the resilience of farming systems by increasing farmers' autonomy and by developing and adapting plant populations in their cultivation sites. This action is part of the ProABiodiv project that involves several groups and aims to define and implement various ways to manage collectively plant varieties adapted to animal feeding strategies: esparcet (sainfoin, *Onobrychis sativa*), cocksfoot (orchard grass), clover, alfalfa and maize.*

### Key-words

*Participatory plant breeding, Forage species, Seed house, Plant adaptability*

### Which of "our" topic areas are involved?

**Consider the list below but feel free to describe it with some details**

- nutrient management
- soil management
- variety choice
- pest and disease management
- weed management
- system resilience
- knowledge sharing

### EIP Focus Group Themes

**Besides the FG on arable yields in organic farming is the case pertinent to other FG?**

- Protein crops
- Arable yields in organic farming
- Reducing the use of antibiotics in the pig sector
- Soil organic matter content: Mediterranean region
- Genetic resources: co-operation models
- Integrated pest management (IPM) on Brassica spp

### Briefly describe the action, what activities are included and which results they produced/are producing

*Several community management seed systems are being currently set up in France. Such innovative initiatives are raising issues such as: how to obtain, improve and maintain adapted plant genetic resources? How can farmers' communities organise themselves? Which routines, skills and tools must be developed?*

*Participatory plant breeding was launched considering sainfoin diversity and taking into account its place in the crop rotation and the impacts on animal health. Plant flexibility enables several uses to be valued: grazing, hay and seed production in mixture crops with other forage species. The group has worked on the organisation of community seed banks to manage plant breeding and seed conservation. It is an example of how starting from the concrete problem of improving one crop it is possible to move towards the improvement of the whole farming system.*

### Who are the actors involved?

*The ProABiodiv project involves : mixed crop-livestock farmers, organic or not; sheep farmers and*

*veterinarians (AVEM); extension services and researchers in genetics, sociology and economy.*

**Who launched the initiative? And when did it start/end?**

*The ProABiodiv project (national project funded by the French Ministry of Agriculture) started in 2011. The synergy between project partners allows to expand skills, mutualise knowledge and value experiences, tools and know-how.*

*One of the main expected outputs of the ProABiodiv project is a collective book based on the experiences of the four community seed systems involved in the project.*

**Was it a success or a failure?**

*This project is on-going. It shows how to bridge the gap between scientific knowledge and the know-how of practitioners.*

**Which are the strong points for the success (partial or total)**

*High motivation and expectations from all partners, together with implication and willingness from farmers. Complementarities and synergies among the various actors, reinforcing individual and collective capabilities.*

**Which are the weak points (for failure or for improvement)**

*Necessary time investment to learn to work together. The first year of the project was dedicated to establishing confidence (and understanding) among partners as well as a dynamics enabling a collective knowledge production process in the project(s) frame. Another time-related issue is linked with the biological component: forage species growth and development are slow; seed production is low as well.*

*Therefore, direct demonstration effects with field trials are limited.*

**Can it be replicated and/or scaled-up? At which conditions and in which kind of "environment"/farming system/socio-economic conditions?**

*Shifting from a logic of conservation to a logic of dynamic management (i.e. to generate innovation) of genetic resources is also a human adventure through the collective organisation implied as well as the knowledge and skills which are closely related.*

*Such an agroecological approach enables to bridge the gap between knowledge from scientists and from practitioners. Solutions must be locally developed as they are connected to a specific background, ensuring that outputs aim to guide practitioners in raising the relevant questions rather than providing recipes or ready-made solutions.*

**From the methodological point of view is there something innovative in it that can be taken as example?**

*Building a "Community Seed Bank" (or "Seed House", for "Maison des semences ") is not building walls but building links between people. It is made little by little, step-by-step: scientists and practitioners learn together all along the process since at each new step new questions are raised (experiential science). This initiative will persist over time only if the work carried out is recognised. The only opportunities available are those we will be able to generate.*

*Solutions must be locally developed as they are connected to a specific background, producing outputs that guide practitioners in raising the relevant questions rather than providing recipes. The original approach of this project is a prototype which can inspire other groups willing to contribute to a Local Management Dynamics (LMD) of genetic resources. The experience served as a case study for a summer school on agroecology and that was the opportunity for economic and agronomic evaluation. This project is also in keeping with the agro-ecological plan proposed by the French Ministry of Agriculture.*

**Funding source**

- FP7 or previous FP
- Other EU R&D sources
- Other EU sources
- National or regional R&D funding sources
- National or regional rural development programmes
- Other sources

**Website**

[http://www.avem12.org/maison-de-la-semence\\_36.php](http://www.avem12.org/maison-de-la-semence_36.php)

*AVEM: Association Vétérinaires Eleveurs du Millavois (Aveyron, France)*

**Contacts**

*Laurent Hazard, INRA SAD Toulouse, France (hazard@toulouse.inra.fr)*