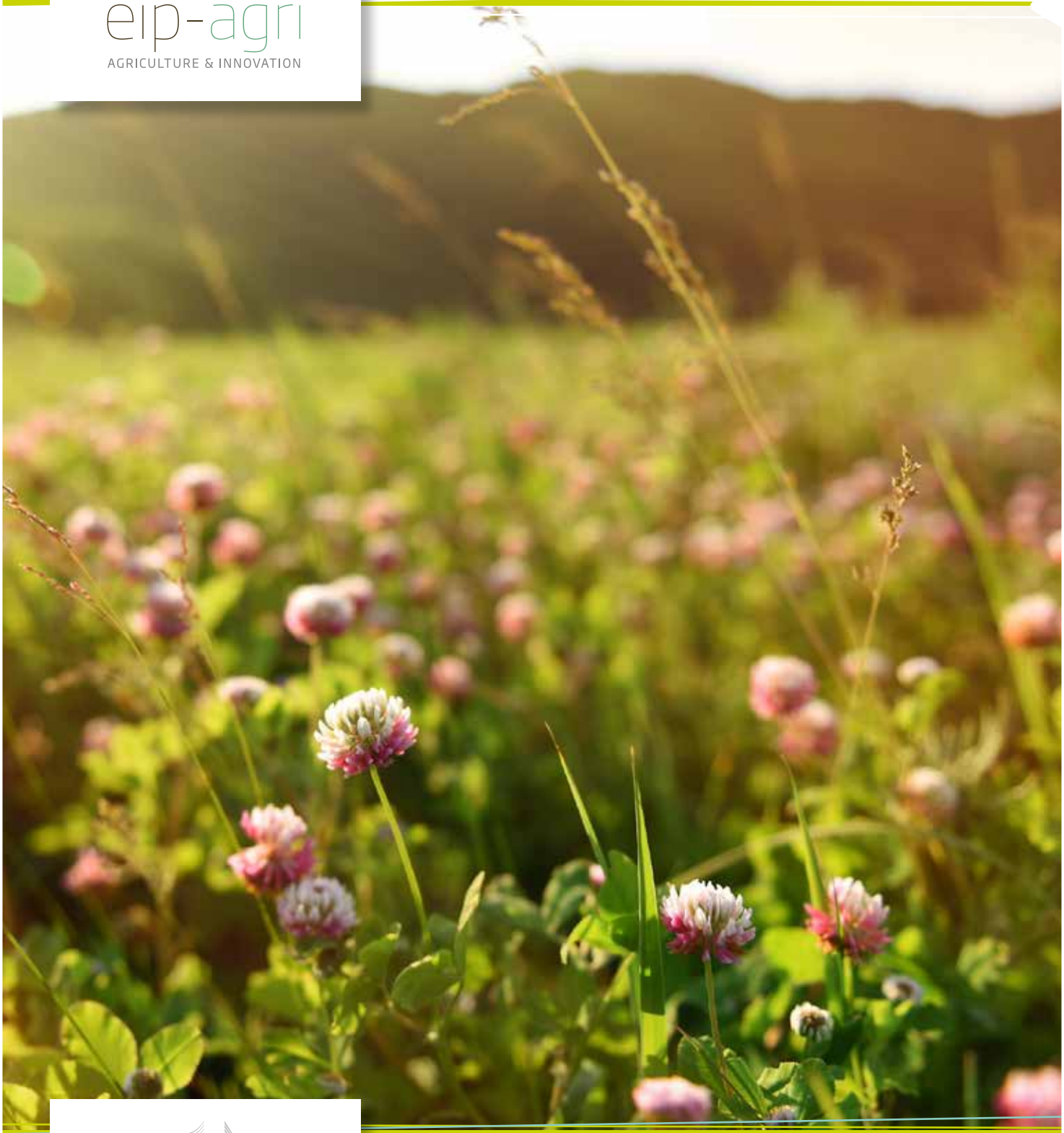
eip-agri
AGRICULTURE & INNOVATION

Sustainable and resilient farming

Inspiration from agro-ecology



funded by European Commission

Table of contents

This brochure has been produced within the framework of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), which was launched by the European Commission to promote innovation in the agricultural and forestry sectors and to better connect research and practice.

This publication follows up on the work of several EIP-AGRI Focus Groups and workshops. All results from these events can be found online via www.eip-agri.eu. For more details on the Operational Groups and other innovative projects featured in this brochure, please see the EIP-AGRI project database on the EIP-AGRI website.

This is an EIP-AGRI Service Point publication.
Brochure 'Sustainable and resilient farming. Inspiration from agro-ecology', February 2020
Pictures: Alfred Grand; EIP-AGRI Service Point; João Palma; Jo Smith; LIFT; Network 'From uses to users' / 'Des usages aux usagers'; Operational Group 'Agroecological cover'; Operational Group 'Improved forage production and conservation'; Operational Group 'Innoveg'; Xavier Remongin/Min.Agri.Fr; Shutterstock; UNISECO.
More information: www.eip-agri.eu

Agro-ecological approaches for a resilient European agriculture

European farmers are faced with increasing challenges, including the effects of climate change. Agro-ecological approaches can help them to develop more sustainable and resilient farming systems that combine stable yields with enhanced biodiversity and ecosystem services.

Agro-ecological approaches are inspired by natural ecosystems. They focus on the interactions between plants, animals, soil organisms, people and the environment. This means that they optimise the use of natural resources, enhance biological processes in the soil, and improve biomass, nutrient, carbon and water cycles. This allows producers to reduce external inputs and costs, while improving the health and resilience of plants and animals. Different types of farming systems are using agro-ecological approaches across Europe. Some of these focus on diversification, including agroforestry, mixed crop-livestock systems, or crop rotation and diversification to increase productivity and resource efficiency and create new market opportunities.

Agro-ecology delivers solutions for local conditions and challenges. Ideally, these innovations are created together, combining science with practical knowledge and modern technologies, and the know-how and expertise of different producers. This way, agro-ecology can give farmers and foresters more autonomy with long-term solutions that are adapted to their needs, leading to resilient farms.

This brochure features inspiration from a number of EIP-AGRI Operational Groups and other innovative projects and networks that are exploring ways to develop agro-ecological practices for European agriculture and forestry, with agricultural, environmental and economic benefits. They bring people with diverse expertise together to make the most of local know-how for mutual benefit.

- **EU research and innovation support ecological approaches for agriculture. Read more in the** AgriResearch factsheet 'Ecological approaches and organic farming'.

Sustainable production with a heart for natural resources

Agro-ecological farming practices focusing on diversification of farming systems, such as agroforestry, intercropping, mixed crop-livestock systems and crop rotation, can help farmers produce good yields while using natural resources more efficiently. These practices can help improve soil health and carbon sequestration, water quality and nutrient flows, and control pests and diseases, and they can make farming systems more climate-resilient. Diversifying farming systems can also help spread economic risk and increase farmers' income.

Producing protein-rich forage for climate-proof farming

Drought and other effects of climate change are increasingly affecting forage production and conservation. An Operational Group from Slovenia is testing how crop rotation and crop diversification can help Slovenian farmers to improve the quantity and quality of their animal feed.

"On three of our six test farms, we are comparing silage production with winter legume catch crops only, and mixed with grasses", project coordinator Branko Kramberger explains. "On the other farms, we produce lucerne (*Medicago sativa*), both pure-sown and in mixtures." The lucerne is being tested for its resistance to drought. One of the project aims is to test the potential of such conserved feed to adapt livestock production to climate change. The project is also exploring whether the production of lucerne can be increased, because it delivers stable yields and its mixtures may be better suited for conservation. It also assesses feeding value and fermentation quality of the silage that is produced.

"By introducing more legumes in the rotation, more nitrogen can be captured for fertilisation", Branko says. "This increases soil fertility and reduces the need to use mineral N fertilisers. The production of winter catch crops does not reduce the potential of arable land for food production. On the contrary, due to its positive effects on the soil and consequently on the following crop in the rotation, the production potential even increases."

"Most Slovenian farmers use Italian ryegrass, but many of them also produce silage with winter catch crops. We see a high interest in producing more forage with lucerne." All results will be presented to farmers as a good innovative practice. "Adopting these practices can give our farmers a high quality winter forage yield with additional benefits for soil health. They can use fewer external resources, create more autonomy on their farms, and make their farms more resilient to the challenges of climate change."

More information?
Check the EIP-AGRI database.

- The EIP-AGRI Workshop 'Cropping for the future' highlighted benefits of crop rotation and crop diversification for agriculture, and brought together innovative projects that explore these issues.

- The 'Crop diversification cluster' unites six Horizon 2020 multi-actor projects: Diverfarming, DiverIMPACTS, DIVERSify, ReMIX, LegValue and TRUE. Find out more www.cropdiversification.eu.

Better soil health to reduce inputs

Dealing with plant pests and diseases and managing weeds is costly and time-consuming. Pesticides and herbicides may also have a negative impact on human health and the environment. Non-chemical management techniques, including crop rotation and diversification, intercropping, reduced tillage, cover crops, mechanical weed control and precision weeding can help prevent or control weeds. They can also improve biodiversity and ecosystem services, and optimise soil, nutrient and water flows. As a result, better soil structure and soil health can increase resilience to outbreaks of pests and diseases. This can help decrease farmers' dependence on external inputs and support stable yields.

Cover crops for quality soil in the Po river valley

In recent years, many farms in the Italian Po river valley suffered from decreasing levels of soil organic matter and more weeds. This was due to a number of practices, including a lack of organic matter input, repeated tillage of the land, and periods where the soil was kept bare. Operational Group 'Agroecological cover' developed innovative conservation tillage systems for farms in the Emilia-Romagna area, based on the use of cover crops.

The project cultivated spring-summer crops such as maize and soybean. These were alternated with autumn-winter cover crops including Italian ryegrass mixed with clovers, rye, mustard and phacelia. The cover crops were not harvested but were used to mulch the soil surface when the crops were sown.

"Our tests have shown that we can cultivate spring-summer crops in a no-tillage system with good and stable yields. Keeping the land covered helped to reduce weeds", says project coordinator Paolo Mantovi. "We saw an increase in soil organic matter and in carbon sequestration, benefiting the fertility and functionality of the soil and its capacity to recycle nutrients. While we had to deal with some issues in cover crop management, the new cropping system is economically sustainable. We are happy that we can now share these results with other farmers in the region."

▸ This Operational Group held its final conference at the end of 2019. Find out more on http://cover.crpa.it or in the EIP-AGRI database.

▸ The EIP-AGRI Focus Group 'Non-chemical weed management in arable cropping systems' collects good practices, decision support tools and innovative ideas on the topic.

▸ Horizon 2020 project IWMPRAISE promotes the implementation of Integrated Weed Management in Europe: https://iwmpraise.eu

Operational Group Innoveg is developing agro-ecological techniques to control pests in tropical fruit and vegetable crops in the French department of Mayotte. It also supports farmers in diversifying production.
More info in the EIP-AGRI database or the 2019 Agri-Innovation Summit factsheet.

Supporting the transition to agro-ecology

To support a successful transition to agro-ecology, farmers need to know the agricultural, economic and environmental benefits of agro-ecological farming systems. One of the principles of agro-ecology is that farmers and others in the chain co-create innovation to ensure its adaptation to local needs.

Digital solutions, such as user-friendly decision support tools, can support farmers to manage their crops and animals more efficiently. Digital platforms can connect farmers to others in the chain, to share data and knowledge or to optimise short supply chains. On-farm trainings and demonstrations can offer farmers new skills, and stimulate peer-to-peer learning and the take-up of innovative practices.

Understanding barriers and opportunities

To support European farmers in adopting agro-ecological approaches, Horizon 2020 research and innovation projects UNISECO and LIFT are assessing the benefits of different agro-ecological systems for farmers, and potential barriers for their uptake.

UNISECO coordinator Gerald Schwarz: "Changing farm practices can have a big social and economic impact on farmers. At a range of farms in 15 European countries, UNISECO is examining the impacts of innovative strategies and incentives for agro-ecological approaches. We want to make these approaches sustainable for farmers. The project shares knowledge about different agro-ecological farming systems and conditions that can increase productivity and profitability."

UNISECO

How does UNISECO support farmers to adopt agro-ecological practices?

"UNISECO has set up multi-actor platforms with farmers, advisers, researchers and others in the value chain to stimulate knowledge exchange and co-learning on the benefits and impacts of the agro-ecological transition. The project uses three decision support tools, giving information about the environmental, economic and social performance of different farming systems. These tools can help increase the farms' sustainability. We are also developing a knowledge hub that disseminates knowledge about implementing agro-ecological practices."

What would be the biggest success of UNISECO?

"We want farmers and others in the value chain to be aware of the potential that agro-ecological approaches can have for them. We hope that the people involved in our multi-actor platforms will continue to explore and promote agro-ecological transitions beyond the duration of the project."

More information:
https://uniseco-project.eu

"In over 30 case studies, LIFT compares different farming approaches – from most conventional to most ecological – based on a farm typology developed by the project. We want to understand how socio-economic and policy factors impact the adoption, performance and sustainability of ecological farming in the EU. We regularly share results with the farmers, farm organisations and advisory services involved in our case studies. We aim to help transfer knowledge between researchers, farmers and others in the field. At the end of the project, a 'Massive Online Open Course' will share all project results with those that can benefit from them."

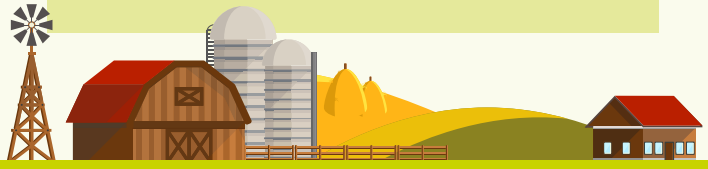
- LIFT coordinator Laure Latruffe -

More information: http://www.lift-h2020.eu

Spreading knowledge across Europe

- Did you know? The EIP-AGRI has organised over 16 Focus Groups on topics related to agro-ecology. Find an overview of all events and publications from the EIP-AGRI network tackling the issue.

- The Agri-Innovation Summit 2019 focused on the transition to agro-ecology for European farmers. Read all results on the official AIS website.



Farmer innovation adapted to local needs

French project 'From uses to users' supports farmers to develop technological solutions, tools and machinery adapted to the needs of their farms. "We believe that technological solutions need to be made with, by and for farmers", says Marie Mardon from partner organisation L'Atelier Paysan. "Social and technical farmer networks can play a big role in developing innovation and sharing know-how."

On-farm trainings help small-scale farmers to adjust or build their own tools. This ranges from farming tools for organic vegetable production such as cultivation and weeding tools, to vineyard seeders, self-built mobile chicken coops or renovating agricultural buildings. Marie continues: "Farmers are closely involved throughout, from design to development and on-farm testing. This guarantees the relevance of these innovations because they correspond to a real need on the farm. Developing tools adapted to small-scale farming can help organic farming practices to grow and be improved."

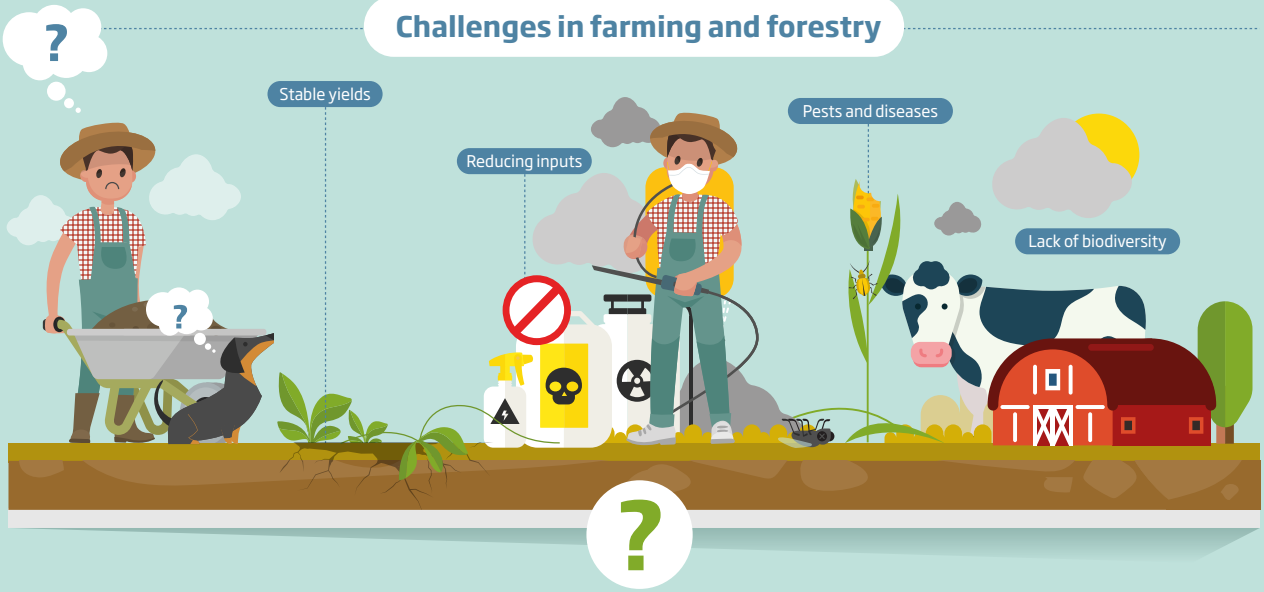
All ideas are collected through an internet forum and are shared through technical factsheets, tutorials and on-farm demonstrations across France. The network wants to give organic farmers and new entrants the skills to develop user-friendly tools for their farms. This enhances local know-how and gives farmers autonomy and resilience for the future.

- **More information:** https://latelierpaysan.org/Le-projet-UsageR-E-s

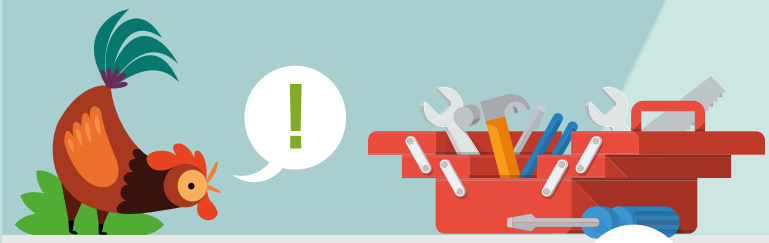
Infographic

eip-agri
AGRICULTURE & INNOVATION

Challenges in farming and forestry

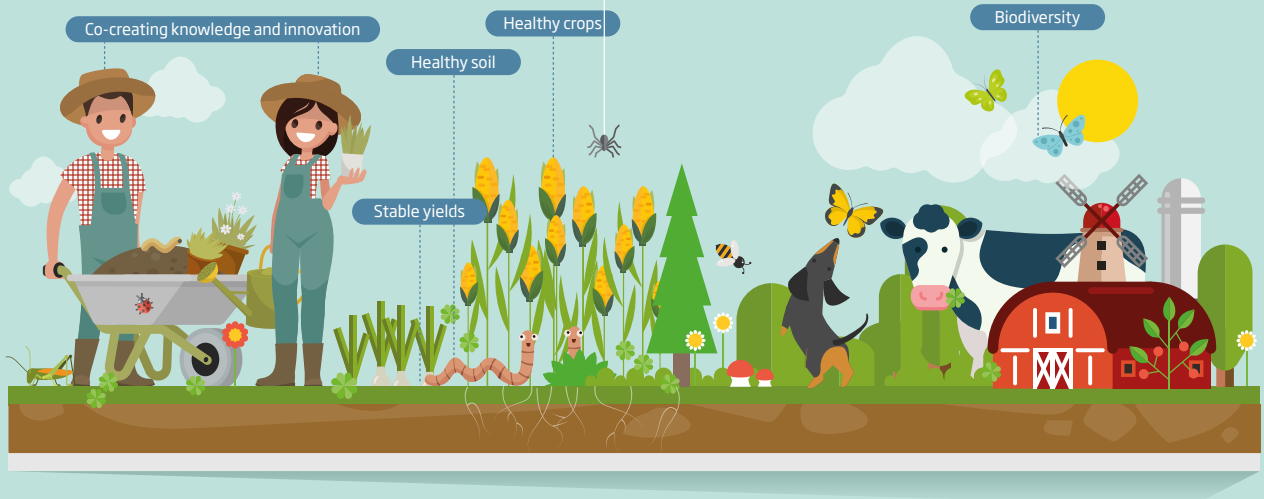


Tools to support the transition to agro-ecology



- Agro-ecological measures adjusted to local conditions
- User-friendly decision support tools
- Exchanging knowledge

On-farm resilience and sustainability through agro-ecology



Join the EIP-AGRI network at www.eip-agri.eu

funded by European Commission