

eip-agri  
AGRICULTURE & INNOVATION

# Water & agriculture

Smart solutions for on-farm water management



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This brochure has been produced within the framework of the European Innovation Partnership '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.

The EIP-AGRI Focus Group on 'Water & Agriculture' brought together 19 experts with different backgrounds and experiences (scientists, farmers and advisers) in 2015-2016, to explore farm-level adaptation strategies to deal with water scarcity. This brochure follows up on the [final report](#) in which the Focus Group listed its conclusions. All Focus Group results can be found online via [www.eip-agri.eu](http://www.eip-agri.eu).



## ► Strategies for water management on the farm

Water is an essential resource for crop and livestock production. Climate change is causing variations in temperature and rainfall, forcing farmers to rethink how to produce their crops, breed their animals and manage their farms. To counteract the negative impacts of climate change and water scarcity on agriculture, a number of innovative strategies and measures can be applied on the farm. Actions to conserve water on the farm can also be complemented by off-farm measures.

- Increasing the availability of water for crops and livestock, including the reduction of water loss
- Using water more efficiently, and increasing irrigation efficiency
- Developing strategies to make farms more resilient under water scarcity

*This brochure will show you some inspiring examples of smart solutions for on-farm water management. It also offers ideas for Operational Group projects, in which farmers, researchers, advisers and others can identify together which solutions work best in specific contexts. These groups can also help to spread knowledge about solutions and new strategies to other farmers, inform about their economic viability, and help stimulate their implementation.*







Find more ways to improve soil structure and avoid water loss in the [EIP-AGRI brochure on Soil organic matter](#).

## ► Increasing water resources for crops and livestock

One way for farmers to increase water resources for crops and livestock is by maximising the soil's capacity to store water. Conservation agriculture (CA) is based on reduced and no-tillage practices, keeping the soil covered with organic residues for a longer period of time, and applying crop rotations. This method can improve water infiltration (avoiding water runoff), while the residue cover can reduce evaporation from the soil.

The soil's structure and its capacity to store water can also be improved by increasing soil organic matter in the soil, and by covering the soil surface with organic residues, mulch (for instance compost or manure), or cover crops. Effective weed control in crops and orchards can help to prevent competing plants from using water. Farmers can also increase on-farm water resources by developing water recycling systems, and by constructing wetlands on the farm.



### Dealing with water scarcity on the farm: soil management in Suffolk, UK

Elveden Farms, located in Suffolk, UK, is a farm business that specialises in growing irrigated crops such as potatoes, onions, carrots and parsnips. Although the crops profit from a favourable climate, the sandy soils in the area have low moisture-holding capacity. Water is therefore an extremely valuable resource at the farm, and efficient irrigation and soil management are essential to the farm's success.

Elveden Farms is licensed to abstract a certain amount of groundwater for direct irrigation and for filling reservoirs. To make full use of this water, farm manager Andrew Francis relies on soil sensors to monitor the soil's moisture levels. These help him predict the water demand of his crops. The farm also maximises the moisture-holding capacity of its soils

by improving their organic matter content. Andrew explains: "We have been bringing organic manures onto the farm for many years, but lately we have become more interested in growing our own green manures. We are experimenting with different ways of using green manures, to try and bring down the cost."

The farm continues to invest in ways to secure its water supply and make the most of the available water. "At Elveden, our philosophy is to use the latest knowledge and technology to justify the highest return possible for the water applied to the crop."

**More information:** <http://www.elveden.com>



## ► Making the most of available water

Aside from increasing water resources and avoiding water loss, there are also strategies and tools that can help farmers increase their crop production by using water more efficiently:

- Selecting drought-tolerant crops, and crops with rooting systems that have broader soil contact or that reach water in deeper zones
- Improving sustainable crop management (fertilisation, crop rotation,...) by using decision support systems
- Increasing irrigation efficiency with the help of plant sensors, online services for irrigation scheduling, or precision irrigation



### Smart irrigation in La Mancha, Spain

For centuries, the Guadiana river basin in La Mancha, Spain, has supplied fresh water to the neighbouring wetlands. However, overuse of water resources to irrigate agricultural land nearly caused the groundwater basin to dry out. This caused fires and discouraged migratory birds to stay in the area. With the support of a major private investor, WWF Spain set up a project that provides free decision support tools to local farmers, to safeguard the water supply to the wetlands, and help farmers use the water that is available for crop irrigation more efficiently.

- The tool "Assessment for Groundwater User Communities" (ACUAS) allows farmers to estimate the water consumption of their crops, and check whether this complies with the amount of water they are legally allowed to abstract for irrigation.

► The SITAR tool sends farmers weekly irrigation recommendations via text message, based on their crops and soils, and on information from the regional Irrigation Assessment System.

► OPTIWINE is a decision support tool that calculates the exact amount of water to apply to vineyards, to improve grape quality while also reducing water consumption. The calculations take into account satellite data and data collected by weather, plant, and soil sensors that have been installed on plots.

**More information:** <http://www.wwf.es/mision-posible> (website in Spanish) or contact Mr. Alberto Fernández at [aguascont@wwf.es](mailto:aguascont@wwf.es)





## ► Strategies to make farms more resilient

Many farmers are dealing with water scarcity. To reduce the impact of crop failure, crop diversification may offer a solution. The best soils could be allocated to the most productive crops, while drought-adapted crops could be grown in poorer areas. The poorer part of the land can also be used for natural water retention measures (NWRM) such as buffer strips, grasslands or ponds, which can help to reduce runoff and unwanted flooding.

Networks such as water users associations can improve farmers' access to knowledge. Some innovative measures can be quite complex. This is why it's important for farmers, researchers and others to exchange knowledge about problems and solutions. On-farm demonstrations and trainings, technical advice, user-friendly tools, and research about economic and environmental benefits may assist farmers to adopt new on-farm strategies.

### Reusing wastewater for quality crop production, Italy

In the Italian region of Emilia-Romagna, different partners are collaborating to provide local farmers with purified wastewater for farmland irrigation. The LIFE+ project ReQpro, coordinated by the Research Centre on Animal Production (CRPA), has helped to set up a wastewater treatment plant in the city of Reggio Emilia. This plant purifies wastewater through a combination of rapid sand filtration and H<sub>2</sub>O<sub>2</sub>/UV treatment. The purified wastewater will be distributed over an area of about 2,000 hectares of mainly maize, alfalfa, permanent meadows, tomato and grapes. The aim is to protect water resources by recovering wastewater for irrigation, and conserve surface water and groundwater. The plant treats around 40,000 m<sup>3</sup> wastewater per day.

Paolo Mantovi, researcher at ReQpro explains: "From 2016, the farmers that are involved in this collaboration are receiving the purified wastewater through irrigation canals. The ReQpro system ensures a good traceability of the water, offering real-time information about the water flow to the field, the water's chemical characteristics and the percentage of wastewater in the irrigation water. ReQpro is organising demos, info days and training courses to inform the farmers using the treated wastewater. Farmers are also given advice on the amount of irrigation to apply on individual parcels, and on the best types of irrigation systems to use.

**More information on ReQpro:** <http://reqpro.crpa.it>



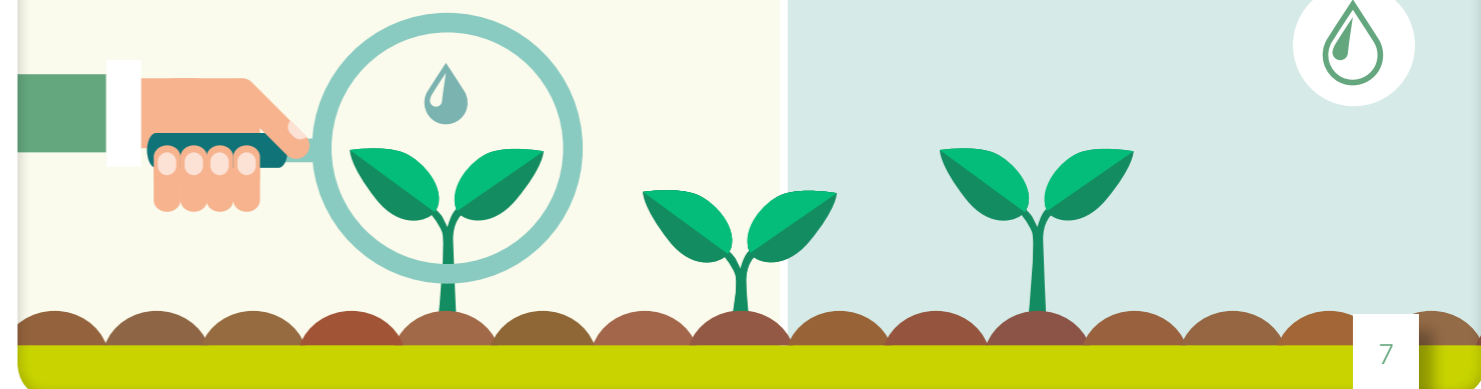
## ► Sharing knowledge for better water management

Some innovative strategies for better on-farm water management require additional research and fine-tuning. This will make sure that they can be applied under local conditions, and that they are economically viable on the farm. Working together and setting up EIP-AGRI Operational Groups can also stimulate knowledge exchange.

### Some ideas for Operational Groups

- Adapt conservation agriculture to local conditions and cropping systems, demonstrating the long-term importance of good agronomic practices for soil fertility and yield stability
- Determine local benchmarks and use them as a reference for crop and irrigation performance
- Evaluate new crops to increase diversification
- Test and identify cultivars of spring-summer crops that are less sensitive to low temperatures, to advance sowing time
- Develop and test user-friendly decision support systems for local conditions

For more ideas for Operational Groups and identified research needs, have a look at [the final report](#) of the EIP-AGRI Focus Group on Water and Agriculture, or [visit the dedicated webpage](#).



## Resource-efficient vegetable production in Germany

In Hessen, Germany, members of an Operational Group are currently developing an online decision support system for vegetable crops. This tool should make it easier for farmers to set up a sustainable, economical, and resource-efficient irrigation schedule for open-field vegetable production. The tool will allow farmers to control the irrigation status of their crops from any internet-enabled terminal, and to receive irrigation recommendations.

► **More information on this and other German Operational Groups:** <https://www.netzwerk-laendlicher-raum.de/themen/eip-agri/eip-datenbank/>

► **Find out more in the EIP-AGRI brochure on Operational Groups**



**EIP Water**  
Boosting opportunities – Innovating water

The European Innovation Partnership on Water specifically facilitates the development of innovative solutions for European and global water challenges. EIP Water also supports the creation of market opportunities for these innovations.

► **More information:** <http://www.eip-water.eu>

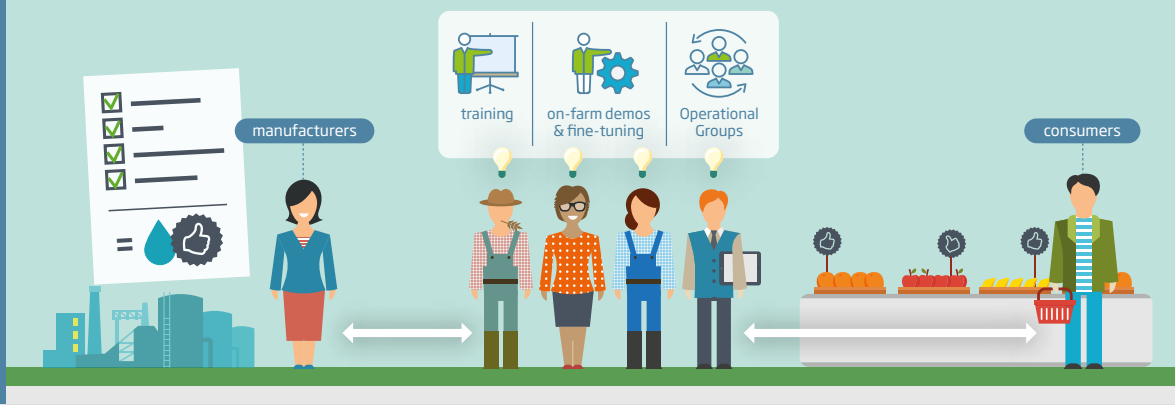


## Water & agriculture: adaptive strategies at farm level

### CHALLENGES



### KNOWLEDGE EXCHANGE



### INNOVATIVE ON-FARM SOLUTIONS

