GO SETOS - Multifunctional borders for sustainable landscape and agriculture

EAFRD-funded projects

An EIP-AGRI Operational Group working together to increase the implementation of multifunctional hedgerows that offer environmental benefits as well as climate mitigation and adaptation.

SPAIN

Climate change adaptation

Location
Murcia

Programming period
2014 – 2020

Priority
P4 – Ecosystems management

Measure
M16 - Cooperation

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National/Region 63 149.67

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2018-2020

Project promoter*
EIP-AGRI Operational Group Sustainable Landscape and Agriculture.

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Summary

Establishing multifunctional hedgerows around agricultural fields is a steadily increasing activity, included in several policies as a means to secure sustainable agriculture and climate change adaptation. This project, taking place in the region of Murcia, Spain, involves the design, implementation and monitoring of multifunctional hedgerows to contribute to a sustainable agricultural system with a low environmental impact.

By implementing perennial vegetation, more CO_2 will be captured, contributing to climate change mitigation. The creation of ecological corridors and the diversification of the vegetation will also increase the resilience and biodiversity of farming systems, a key element in addressing the current environmental crisis the planet is facing. A particular feature of the project is that it involves multiple actors at different levels of the agricultural sector. For instance, very important scientific information was provided through the collaboration with research institutes and that knowledge was then applied in the field to different types of agriculture. The main actions undertaken by the project were the implementation and monitoring of natural hedgerows and the public dissemination of practical information related to these sustainable, climate-focused actions.

Results

By the project's end, 20 hedgerows spread across 5 ha are expected to be fully established, with 35 000 seedlings introduced. In addition to their environmental benefits, including wildlife habitat, natural pest management, and climate mitigation through sequestration and storage, the hedges offer significant adaptation benefits as well. Hedges increase soil organic matter and improve soil structure to provide erosion control, infiltration and water retention capacity to combat the impacts of extreme rainfall and drought.

Lessons and recommendations:

- Testing the viability of new landscape features that promote reductions in chemical inputs within farming systems works well when involving multiple actors in designing, monitoring and changing the implemented actions throughout the collaboration.
- It is important to build capacity and confidence in the practices by providing scientific information but also demonstrating different approaches and positive results to increase the uptake of alternative measures.

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (https://ec.europa.eu/eip/agriculture/en)

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Context

Agriculture in the Murcia region has intensified over the years, which has led to the simplification of farming landscapes and a critical decrease in biodiversity. The same has been observed in other parts of the world, where the intensification of agriculture has led to an increase in farm size and field consolidation, with the consequent removal of natural vegetation areas. The environmental impacts of unsustainable practices have increased and multiple ecosystem services are being negatively affected. Soil quality has deteriorated, and the loss of plant diversity has negatively impacted pest control. Moreover, a worldwide decrease in the abundance and diversity of pollinators has been observed. Considering the vital role that pollinators play in the functioning of ecosystems, the productivity and quality of farming systems could be compromised.

In terms of climate change, intensive agriculture generates high quantities of CO_2, due to the high input of resources (fuel, fertilisers, etc.). Furthermore, the loss of organic matter reduces the soil's capacity for carbon sequestration and decreases soil quality. This is because carbon plays an important role in soil structure and nutrient exchange. As global population rates increase, a new agricultural model is needed that reduces the negative impacts on its base resources and produces food for the planet in concert with nature. This is especially important in parallel with the climate models predicting an alarming situation involving major disruption and thus demanding a significant change in terms of the way we produce food.

Objectives

The main objective of the project is to implement multifunctional hedgerows along agricultural fields to create a more sustainable agricultural system with low environmental impacts. To this end, the project aimed to:

- Design hedgerows for different types of crops that reduce erosion, increase the population of natural enemies of pest and disease carriers, for pest control, increase the resilience of farming systems, and contribute to climate change mitigation.
- Develop activities and interactions amongst farmers to raise awareness on the importance of the recovery and conservation of ecosystem services in agriculture.
- Disseminate information about the importance of sustainable agricultural practices to the public.

Activities

The project is being implemented by an Operational Group (OG) formed by Arco Sur Irrigators Community (coordinator of the group), six private companies (Casa Pareja, Frutas García-Vargas, Worldmark Alimentos Ecologicos SL., Castillo de Chuecos S.L., Ecoagrícola el Talayón S.L. and BF Agrícola 4G SL.) that own the farms on which the actions are being implemented, two research centres (IMIDA and CEBAS), one NGO (ANSE) and other external collaborators, such as OISMA (Ministry of Culture, Tourism and Environment of the Murcia Region) and SSV (Plant Health Service of the Murcia Region). The variety of partners involved ensures that all the stakeholders participate in the process and can find a common ground on which to base their collaboration, essential to the success of any cooperation project.

For the implementation of the hedges, the methodology followed started with the design of each action, considering the specific needs in terms of pollinators, natural enemies, erosion control, CO_2 capture and nitrates. For this step, close collaboration between ANSE, CEBAS and IMIDA and the owners of the farm was needed to find the most appropriate hedge for the desired ecosystem services whilst maintaining crop productivity. Then, the plants were produced by the plant nursery owned by ANSE and by other external sources when needed. Planting dates were planned, taking into account the environmental conditions to guarantee the best possible survival of the hedges. To date, 20,000 individual plants of more than 60 native species have been planted in 6 different areas of Murcia Region. The hedgerows were monitored periodically to study their growth, detect issues, and correct them when needed.

Prior to planting, the volume of soil erosion and CO_2 capture on the sites was measured. It was also measured after planting to quantify the changes. Erosion volume is calculated by measuring the depth and length of the water trails (resulting from strong rains) to obtain a 3D picture of the erosion. The CO_2 capture is calculated based on the total organic carbon enrichment of the soil under the hedges and on the biomass accumulated in the vegetation. In addition, six insect inventories will be carried out during the project to determine the abundance and richness of natural enemies and pollinators. The data will be compared with similar farms without hedges to determine the efficiency of this measure for creating habitat for natural enemies and providing other ecosystem services.

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Conclusions from the project will be compiled in a final document ("Technical handbook for good practices") to which all partners will contribute. This report will include an evaluation of the possibilities for the development of hedges, including land stewardship, corporate social responsibility, carbon credits or offsets for reducing greenhouse gas emissions.

Main Results

- In terms of economic benefits, the project is expected to generate multiple job positions in plant production, planting and so on, and to open a new market for the design and implementation of hedgerows in farming systems. Plant propagation for the entire region alone, for example, is estimated to be worth EUR 5.2 million. The associated improvement of ecosystem services will generate additional benefits: for example the recovery of natural pollinator populations is expected to improve crops' productivity. The potential economic benefit from vegetation restoration in agricultural areas at the regional level is estimated at between EUR 10.8 and EUR 18.5 million.
- The creation of habitats suitable for natural enemies of pest and disease carriers will allow to avoid the use of chemical products, which also contributes to climate change mitigation and will represent an important cost saving for farmers (estimated at EUR 400/ha). The reduction of fertilisers can decrease the emissions of CO_2 and nitrates, and the establishment of new carbon sinks will positively impact soil quality. These sustainable practices are expected to be replicated across 26 000 ha of multifunctional hedges in the Murcia region, generating greater positive impacts on the environment and climate.
- The suitability of 30 species of flora for the creation of hedgerows is assessed against different indicators (auxiliary fauna, conservation value, CO_2 and nitrate sink and erosion control) in 6 agricultural systems (horticultural, olive, almond, vineyard, slope, irrigated fruit).
- 20 hedgerows across 5 ha are expected to be established, with 35 000 seedlings introduced. The predictions in terms of carbon sequestration are 7 000 tonnes of CO_2 in 40 years and an 80% storage.
- A total of some 440 people are expected to be involved in the project's activities.

Key lessons

The operational group that implements the project is constituted by partners from very different backgrounds and professional activities. Firstly, by one national and one regional institution (CSIC and IMIDA) that carry out the scientific part of the project. Secondly, by an NGO that plays the role of innovation agent (ANSE), and thirdly, by private farms that dedicate part of their land to implement the project's actions. This has fostered an multi-actor approach towards collaboration and knowledge exchange around the process of establishing new multifunctional hedges throughout the region.

The project considers different types of cultivars and highlights the site-dependant variability for the design of multifunctional hedgerows. Thus, this methodology can be replicated in areas with different environmental conditions. Similar projects are being developed in the Iberian Peninsula, and the success of the project's current actions is causing more and more farms to want to join the project. In addition, members of the operational group have collaborated in exchanges and meetings with other operational groups working on the same topic.

Two examples are an EIP-AGRI workshop in Almere (The Netherlands), talking about crop diversification and rotations with other OGs and H2020 projects, and a meeting in Seville (Spain), discussing how to make agriculture and biodiversity compatible in agriculture. This inter-regional and international exchange of information, ideas, experiences and solutions demonstrates the scale of need for remedial measures throughout varying agricultural systems and the benefits from sharing best practices and challenges to improve implementation.

The project contributes to all EU rural development policy strategic objectives. It promotes agriculture's competitiveness by offering new measures for sustainable farming. It ensures the sustainable management of natural resources and climate action as it aims to increase the resilience of farming ecosystems and to improve the population of pollinators. In addition, it tries to achieve a balanced territorial development of rural economies and communities by aiming to create jobs and involving many different actors within the agricultural sector.

Additional sources of information

n/a

*This project has been categorised under 'Climate change adaptation by the nominating National Rural Network

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