

Innovative solutions in agricultural production to increase market competitiveness, restore biodiversity and mitigate climate and environmental risks

Increasing organic orchard yields by integrating intercropped fruit trees and bushes.

EAFRD-funded projects

Location: Opole Voivodeship, Poland

Programming period: 2014-2020

Priority: P1 - Knowledge transfer and innovation
P2 - Competitiveness

Focus Area: Innovation and cooperation

Links with research & innovation

Farm performance, restructuring & modernisation

Measures: M16 - Cooperation

Funding:	Total budget	64 725 (EUR)
	EAFRD	41 185 (EUR)
	National/Regional	23 540 (EUR)

Timeframe: 18/05/2022 - 30/10/2024

Project promoter: Stobrawa Biodiversity Consortium*

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Summary

This EIP Operational Group (OG) project tested an agroforestry technique for fruit orchards which involved controlled mixed cultivation of commercial trees and bush crops. Varieties of autumn raspberry, blueberry, lavender and strawberry were planted between rows of mature peach, apricot, elderberry, nectarine, apple, pear, cherry and plum trees in the Polish village of Świerczów.

To stimulate and enhance the soil's biological activity, silicon and chitosan were added initially as biopreparations. Other biostimulants were used during the growing season to improve yield quality, help mitigate climate risks and optimise natural resistance to diseases, pests and drought. Pollination was promoted by encouraging bee colonies within the orchard and neighbouring forest areas.

*The project promoter/beneficiary is an EIP-AGRI Operational Group. (https://eu-cap-network.ec.europa.eu/operational-groups_en)



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OG findings from the intercropping tests were disseminated locally and nationally.

Project results

- Intercropped mixed cultivation of commercial trees and bush crops proved economically and environmentally successful.
- Organic nutritious fruit harvests from the new intercropping in the first commercial period provided 500 kg of blueberries, 500 kg of raspberries, and 100 kg of strawberries. Other first year yields from the project included 120 kg of honey, 50 lavender bouquets and 20 lavender garlands. These initial yields were forecast to double as the new perennial crops matured further during subsequent growing seasons.
- Soil health improvements made it possible to achieve a planting success rate of 98%.
- Demonstrating commercial advantages of agroforestry intercropping such as making better use of land area via multi-level production and harnessing.
- Increased potential for CO₂ sequestration and water savings.



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Key lessons and recommendations

- This project highlighted the commercial potential of allelopathy, where one organism produces biochemicals that influence the growth, survival, development and reproduction of other organisms.
- A study visit by a Swedish scientist in July 2023 transferred the OG findings to a project implemented under the EU Horizon 2020 research and innovation programme.

Context

This project happened in a seven hectares (ha) of mature multi-species fruit orchard owned by a farmer interested in natural production methods and biodiversity conservation. The orchard grew peaches, apricots, apples (including heritage varieties), pears, cherries, plums, elderberries and nectarines.

Conversion of this orchard land to arable crops was being considered by the owner for financial reasons but a preference to retain the fruit ecosystem led to alternative options also being considered. Meetings took place with experts from the Institute of Soil Science and Plant Cultivation in Puławy, who advised about the possibilities of using Rural Development Programme (RDP) funding for EIP Operational Group (OG) cooperation projects to test recovery and sustainability options for the orchard and the biodiversity that thrived there.

Climate protection was considered important for the orchard's long-term resilience, particularly in mitigating risks concerning water shortages and soil health. An innovative cultivation regime was identified that could reduce irrigation needs and lower soil temperatures while boosting both the absorption and retention of carbon.

This was designed to align with the European Green Deal, including the EU Biodiversity Strategy 2030, the Farm to Fork Strategy and the EU Forestry Strategy 2030, among others.

OG members included the owners of the orchard and neighbouring forest, a farmer's association, agricultural advisors and other experts.

Objectives

This OG collectively set out to:

- Develop natural resilience production techniques for minimising risks to the sustainability of fruit yields.
- Introduce soil health-promoting properties for improving economic efficiency and market competitiveness of orchards.
- Facilitate ecosystem restoration, biodiversity conservation and climate protection.

These would be achieved by:

- Introducing intercropping agroforestry cultivation simultaneously with soil activation and plant protection methods using various types of organic substances such as biopreparations and biostimulants.
- Designing and implementing cultivation technologies to minimise production risks and mitigate climate threats during the first two years of growth after planting new areas of blueberry, autumn raspberry, vine, lavender and Scots pine.

Activities

Project implementation involved three main phases:

1. Preparing and establishing intercropping 'coordinate' planting strips for autumn raspberries, blueberries, lavender and strawberries in the orchard by:
 - Root pruning existing fruit trees and subsoiling preparations for coordinate planting strips.
 - Pruning crowns of existing fruit trees removing all branches shading space of the planned coordinate areas.
 - Ploughing furrows in coordinate strips.
 - Activating soil in the intercropping strips by introducing large quantities of biologically active organic matter. This organic matter was also used after planting as a cover mulch and silicon-based biostimulants were used during the growing season.
 - Mixing top dressed organic matter with the native soil.
 - Planting in alternate 'co-rows' 3 000 blueberries (five varieties, nine rows), 3 200 raspberries (two varieties, nine rows), 1 400 lavender seedlings (two rows) and strawberries (one row).
 - Positioning bee apiaries.



2. Care and management of established intercropping and apiaries including planting pollen- and nectar-producing plants.
3. Promoting project and results at national events during 2022 (e.g. National Agroforestry Conference and the Polish OG Summit) and to the local community,

The project's completion date was extended to 30/10/2024 allowing observation, consolidation and communication of project findings from the 2024 growing season.

Main results

- > Intercropped mixed cultivation of commercial trees and bush crops provided commercial benefits and allowed the orchard to remain productive for nutritious food supplies and as a biodiversity habitat.
- > Organic nutritious fruit harvests from the new intercropping in the first commercial period provided 500 kg of blueberries, 500 kg of raspberries and 100 kg of strawberries. Other first year yields from the project included 120 kg of honey, 50 lavender bouquets and 20 lavender garlands. These initial yields were forecast to double as the new perennial crops matured further during subsequent growing seasons.
- > Soil health improvements made it possible to achieve a planting success rate of 98%.
- > Demonstrating commercial advantages of agroforestry intercropping such as making better use of land area via multi-level production and harnessing the phenomenon of allelopathy, where one organism produces biochemicals that influence the growth, survival, development and reproduction of other organisms.
- > Increased potential for CO₂ sequestration and water savings.
- > Safeguarded biodiversity habitat and agroecosystems sustaining traditional rural landscape features.
- > Enhancing the natural yield potential of soils and strengthening natural ecosystem resilience.
- > Promoting organic and efficient forms of agricultural production through numerous national and local meetings.

Key lessons and recommendations

- > A change in the perception of soil as something that is alive and requires care and effort to preserve.
- > A study visit by a Swedish scientist in July 2023 transferred the OG findings to a project implemented under the EU Horizon 2020 research and innovation programme.
- > One way of making the meetings with the local community more attractive was to borrow from the Kochanowski Theatre in Opole an outfit reminiscent of the 18th century costumes the beekeeper and his wife wore at the meetings.

Quote

"Production in harmony with nature - Strength in nature".

Operational Group's slogan

Additional information:

Online article:

<https://agronomist.pl/artykuly/uprawy-wspolzedowe-na-topie>

Website:

www.bioroznorodnoscstobrawy.pl



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