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Sustainable Agricultural Production and EU Funding Directions

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Introduction

Sustainable agriculture is one of the most critical and pressing challenges of our time. In the context of global environmental changes and the increasing demand for food driven by population growth, agricultural stakeholders must reconsider their practices to ensure long-term sustainability.

The aim of this material is to spark the interest of horticulturists in organic farming and provide practical guidance for implementing sustainable production methods. It offers an overview of the principles of sustainable development, the United Nations' goals, as well as the European Union's strategies and funding objectives for sustainable agriculture.

Special emphasis is placed on the benefits and challenges of sustainable farming and the role of digital innovations in modern agriculture. Through this material, participants will become familiar with the basic principles of sustainable agriculture and practical methods to make their horticultural operations more environmentally friendly.

In addition, by presenting EU funding opportunities, the material provides concrete guidance on how to apply for grants and how horticultural businesses can collaborate within consortia to promote sustainability. Our goal is to provide horticulturists not only with theoretical knowledge but also with practical skills to help them navigate the world of sustainable agriculture and make effective use of EU resources.

The knowledge and skills acquired here contribute to ensuring that horticultural operations not only comply with environmental regulations but also remain competitive in the market. Ultimately, the objective is to enable horticultural businesses to operate sustainably in the long term, thereby supporting the well-being of future generations and the protection of our planet.

Sustainable Development and Its Goals

The Concept of Sustainable Development

“Sustainable development is a socio-economic system that preserves natural values for present and future generations. It uses natural resources sparingly and purposefully, ensuring long-term ecological improvement in quality of life and the preservation of biodiversity.” (Environmental Protection Act, Hungary).

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According to the Food and Agriculture Organization of the United Nations (FAO), sustainable development is a form of management driven by the conservation of natural resources and directed towards technological and institutional change. It aims to continuously meet the needs of present and future generations.

Such sustainable development—in agriculture, forestry, and fisheries—protects land, water, and the genetic foundations of plant and animal life. It employs environmentally sound, technically appropriate, economically viable, and socially acceptable practices. (FAO, 1991).

This definition also reflects the second-generation approach, integrating environmental concerns and linking them to concrete strategies for implementation.

Practical Example from Hungary – Local Organic Farm: Rendek Eco-Farm

Located within the Kiskunság National Park, Rendek Eco-Farm successfully applies sustainable agricultural practices. The farm employs a variety of methods aligned with the core principles of sustainable agriculture, including chemical-free crop production, the conservation of natural water sources, and the maintenance of biodiversity.

United Nations Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) comprise 17 global objectives aimed at ending poverty, protecting the planet, and ensuring prosperity for all by the year 2030. Several of these goals are directly related to agriculture and sustainability.

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Goal 2: Zero Hunger

This goal aims to achieve food security, improve nutrition, and promote sustainable agriculture. Steps toward implementation include the promotion of sustainable agricultural practices that increase crop yields and improve food quality. It is also essential to strengthen the capacity and market access of small-scale farmers and to develop nutrition programs, particularly for children and pregnant women.

Goal 6: Clean Water and Sanitation

This goal focuses on ensuring access to clean drinking water and improving wastewater treatment systems. Implementation includes improving water use efficiency through methods such as drip irrigation and rainwater harvesting. In addition, it is crucial to develop water purification technologies and to build and maintain wastewater treatment infrastructure to ensure universal access to clean water.

Goal 12: Responsible Consumption and Production

This goal aims to establish sustainable consumption and production patterns. Key actions include reducing food waste and minimizing waste at all stages of production and consumption. Support should be provided for the production and distribution of sustainable products, and public awareness should be raised through educational and informational campaigns about the benefits of sustainable consumption and production.

Goal 13: Climate Action

This goal targets the mitigation of and adaptation to climate change. Necessary steps include reducing greenhouse gas emissions through the use of renewable energy sources and energy efficiency measures. It is also important to develop climate adaptation strategies, such as cultivating drought-resistant crop varieties, and to engage communities in efforts to combat climate change.

Goal 15: Life on Land

This goal focuses on the protection, restoration, and sustainable use of terrestrial ecosystems. Key actions include protecting and restoring forests and combating deforestation. Programs and measures that preserve biodiversity must be supported, and soil conservation practices should be improved to prevent erosion and the decline of soil fertility.

Best Practice from Italy – Local Organic Farm: Azienda Agricola Finotello

https://www.kahrl.com/on-site-projects/rainwater-harvesting-on-a-farm-in-the-venice-lagoon/

The Azienda Agricola Finotello farm, located in the Venice Lagoon on the island of Sant’Erasmo, is a remarkable example of innovative water management and rainwater reuse in Italy. The farm utilizes a cutting-edge rainwater harvesting system that collects rainwater from greenhouse rooftops for crop irrigation. This practice is especially crucial in a region where land subsidence and overuse of water resources threaten agriculture. The rainwater harvesting system promotes sustainable water use and supports the continuity of local food production.

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How Azienda Agricola Finotello Contributes to the UN Sustainable Development Goals

Azienda Agricola Finotello's sustainable farming practices directly support several UN Sustainable Development Goals. Below is an overview of how the farm's organic methods align with specific goals:

- **Zero Hunger:** The farm utilizes sustainable agricultural practices that increase crop yields and enhance food security. Organic methods help maintain soil fertility and improve crop quality.
- **Clean Water and Sanitation:** The farm employs drip irrigation and rainwater harvesting systems, reducing water usage and increasing efficiency in water supply. These practices help conserve water resources and minimize waste.
- **Responsible Consumption and Production:** The reduction of chemical inputs and synthetic fertilizers supports the development of sustainable production models that are viable over the long term.
- **Climate Action:** Agricultural practices are employed that reduce greenhouse gas emissions. Organic farming methods and water-saving technologies contribute to mitigating the impacts of climate change.
- **Life on Land:** The farm supports biodiversity through practices such as cultivating a variety of plant and animal species, which aid in the preservation and restoration of natural ecosystems.

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Sustainability in Agriculture

Sustainable Agricultural Practices

Within the framework of sustainable agriculture, various approaches have emerged. Some still incorporate conventional tools (e.g., chemical pest control and synthetic fertilizers), while others reject these entirely in favor of ecological solutions. Numerous international studies have compared the sustainability of ecological and conventional farming (Szilágyi et al., 2018).

Conventional farming refers to an industrial, mass-production, energy-intensive agricultural model that relies heavily on synthetic inputs and industrial resources. The primary goal of such systems is profit, leading to increased independence, artificial regulation, and the gradual replacement of natural resources with artificial ones (Ángyán et al., 2004; Mészáros, 2016).

Ecological farming, on the other hand, is a production system that delivers high-quality, chemical-free food while considering environmental sustainability—protecting natural systems, biodiversity, soil and water quality, and animal welfare (IFOAM, Internet source 1).

Organic farmers provide services and preserve goods whose value cannot be accurately assessed using conventional economic tools and calculation methods.

One reason is that a higher proportion of organic farms are located in less favorable agricultural areas compared to the more fertile regions of a given country. It is generally accepted that the labor intensity of fully organic farming systems is greater than that of conventional farming, with labor more evenly distributed throughout the year. However, organic products are typically more marketable, and net income per hectare is often comparable to or even exceeds that of conventionally produced goods (Alvincz & Koltai, 2009).

Objectives and Practices of Sustainable Agriculture

The goal of sustainable agricultural practices is to preserve natural resources, maintain biodiversity, and minimize environmental impacts, while ensuring farm profitability and the well-being of local communities. These practices include organic farming, precision agriculture, soil conservation techniques, improved water-use efficiency, and integrated pest management.

The Most Characteristic Sustainable Agricultural Practices Include:

- **Organic Farming:** A production system that avoids the use of synthetic chemicals and fertilizers, favoring natural materials and processes to maintain soil fertility.
- **Precision Agriculture:** A technology-driven approach that utilizes GPS, sensors, and data management systems to optimize farming practices, reduce waste, and increase efficiency.

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- **Soil Conservation Techniques:** Methods such as mulching, minimum tillage, and green manuring aimed at reducing soil erosion and maintaining soil fertility.
- **Efficient Water Use:** Optimization of water resources through techniques such as drip irrigation, rainwater harvesting, and the cultivation of drought-tolerant crop varieties.
- **Integrated Pest Management (IPM):** An approach that minimizes chemical use by employing biological control methods and cultivating pest-resistant plant varieties.

Best Practice from Hungary – Local Organic Farm: Plótár Farm

Plótár Farm Video

Plótár Farm is an outstanding example of organic farming in Hungary, located in the Sand Ridge (Homokhátság) region between the Danube and Tisza rivers. The farm is especially renowned for its use of regenerative agricultural practices, which have been developed and demonstrated for over 20 years. These methods help preserve soil fertility and enhance biodiversity.

The farm employs innovative techniques such as minimal tillage and the use of cover crops that remain in the soil year-round, preventing erosion and improving soil health. These practices enable the farm to sustainably increase productivity while reducing environmental impacts.

Among the technological innovations used at the farm is Interra® Scan, a gamma-ray-based soil mapping technology that generates high-resolution soil maps with over 800 data points per hectare. This data helps farmers monitor nutrient and carbon levels and accurately determine where and how much fertilizer is needed.

The example of Plótár Farm clearly illustrates how regenerative agricultural practices can contribute to the UN Sustainable Development Goals. Soil conservation techniques and biodiversity-enhancing practices help maintain soil health and improve fertility. The use of innovative technologies and sustainable farming methods supports the sustainable development of agricultural production and helps mitigate the impacts of climate change.

The Five Principles of Sustainable Agriculture

Syngenta (Internet source 2) has developed five guidelines based on the interaction between farmers, the local environment, and technologies. This chapter presents these principles of responsible and sustainable agriculture, which provide a framework for continuously improving agricultural sustainability in collaboration with farmers.

These principles help preserve the long-term value of agricultural systems by ensuring they operate in a resource-efficient, economically competitive, environmentally responsible, and socially beneficial manner. They also support our commitment to innovation aimed at enhancing farmers' profitability and well-being around the world.

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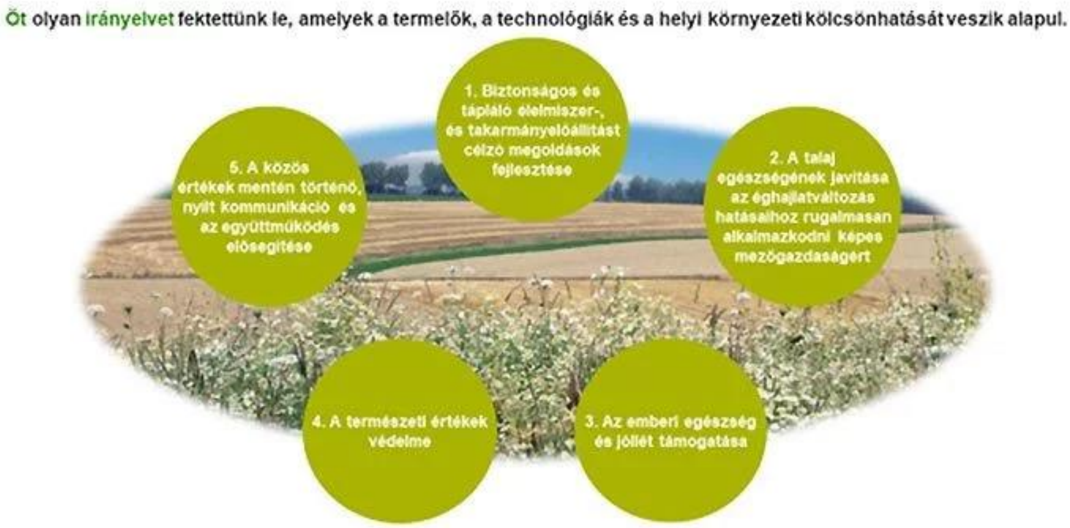

The aim of sustainable agriculture is to preserve natural resources, minimize environmental impacts, and ensure farm profitability. The following five principles of sustainable agriculture contribute directly to these goals:

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1. **Soil Health and Conservation**

   Soil is one of the most critical resources in agriculture, and maintaining its health and fertility is essential. Practices that support soil health include the use of cover crops, composting, green manuring, and minimum tillage. These methods help preserve soil structure, reduce erosion, and increase organic matter content.

2. **Water Management**

   Water is a valuable resource, and its efficient use is crucial in sustainable agriculture. Methods to improve water management include drip irrigation, rainwater harvesting, soil moisture sensors, and optimized irrigation scheduling. These techniques reduce water waste and ensure that crops receive the right amount of water at the right time.

3. **Enhancing Biodiversity**

   Increasing biodiversity is key to improving the resilience of agricultural systems. Integrating diverse plant and animal species, as well as preserving and restoring natural habitats, helps maintain ecological balance on farmland. Greater biodiversity also supports natural pest and disease control, reducing the need for chemical inputs.

4. **Energy Efficiency**

   To increase energy efficiency, agricultural practices should adopt technologies and methods that lower energy consumption and carbon emissions. This includes the use of renewable energy sources, energy-efficient machinery and equipment, and efforts to reduce fuel use.

5. **Community and Economic Sustainability**

   Sustainable agriculture focuses not only on environmental goals but also on community and economic well-being. Agricultural activities should support local communities by creating jobs and providing fair income for farmers. Community sustainability is also strengthened through local marketing and community-supported agriculture programs.

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Advantages and Disadvantages of Sustainable Agricultural Production

The goal of sustainable agriculture is to preserve natural resources, minimize environmental impacts, and ensure farm profitability and the well-being of local communities. Below is a summary of the main advantages and disadvantages of sustainable agricultural production.

Advantages

Environmental Sustainability

One of the main benefits of sustainable agricultural practices is environmental sustainability. Techniques such as using cover crops and composting help preserve and enhance soil fertility and structure. Increasing biodiversity supports the conservation of natural habitats and provides natural pest control. Efficient water management techniques—such as drip irrigation and rainwater harvesting—reduce water waste and ensure optimal water availability for crops.

Economic Sustainability

Economic sustainability is another key advantage. Avoiding the use of chemicals and synthetic fertilizers can reduce production costs. Maintaining healthy soil and biodiversity helps sustain agricultural productivity in the long term. The growing demand for sustainable and organic products can offer a market advantage to farmers.

Social and Community Benefits

Sustainable farming practices support local communities by creating jobs and improving quality of life. Chemical-free production also provides healthier food for consumers.

Disadvantages

Economic Challenges

Transitioning to sustainable agricultural practices can involve high initial investments, including the purchase of new technologies and equipment. Sustainable products are often more expensive, which can be a competitive disadvantage compared to conventional alternatives.

Technological and Knowledge Gaps

Sustainable practices require specialized skills and knowledge that not all farmers possess. Advanced technologies, such as precision agriculture tools, are not always accessible to every farm.

Environmental and Natural Risks

Short-term challenges may include reduced yields during the transition to sustainable methods. Eliminating chemical inputs can make pest and disease control more difficult, posing potential risks to production.

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Best Practice from Italy: The Story of Carlo Finotello

Carlo Finotello and his brother have been farming on the island of Sant'Erasmo in the Venice Lagoon for over 20 years. Their farm was founded in 1996, when Carlo, then stationed on the island during his military service, took over the family operation. Initially, they used conventional methods and sold vegetables through wholesale markets. However, in 2007, they shifted to direct and zero-kilometer marketing.

"We spent years searching for equipment or mechanized solutions for certain farming tasks. Our goal was to reduce the use of pesticides—especially herbicides—since we don't use them, particularly in cultivating the Sant'Erasmo artichoke. Weed control is difficult, so it's important to invest in new solutions and techniques that preserve the environment while maintaining traditional methods. At the same time, we must adapt to technological progress and continually improve our methods to keep up with the evolving world," Carlo explains regarding the challenges he faced.

Carlo's commitment to sustainable agriculture extends beyond production. He is actively involved in local agricultural communities and plays a leading role in the Sant'Erasmo Purple Artichoke Growers' Association, recognized by the Slow Food Presidium. Additionally, he heads the local branch of Coldiretti Venezia, Italy's largest farmers' organization.

Carlo and his brother's experience illustrates both the challenges and benefits of transitioning to sustainable agriculture. Their story is not just about environmental sustainability, but also about community cooperation and the value of direct consumer relationships. Carlo's example demonstrates that while shifting to sustainable farming may present difficulties, it offers significant long-term advantages for both farmers and their communities.

Source: YouTube – *The Story of Carlo Finotello*

The European Union's Sustainable Agriculture Strategy

Sustainable Agriculture in the EU

Agriculture in the European Union is not only of key economic importance but also holds significant social and environmental value. EU agricultural policies have long sought to align agricultural production with sustainability goals. The European Green Deal places particular emphasis on sustainability, with the Common Agricultural Policy (CAP) playing a central role in this effort.

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The European Green Deal

The European Green Deal is a comprehensive strategy aimed at making Europe the first climate-neutral continent by 2050. Agriculture plays a crucial role in this transition, as the sector significantly impacts the environment—from greenhouse gas emissions to soil and water protection. The Common Agricultural Policy is one of the EU's primary tools for achieving sustainability objectives, integrating social, economic, and environmental considerations. Its goal is to support the expansion of sustainable farming practices that reduce environmental pressures while ensuring food security and the well-being of rural communities.

Key Objectives

The main objectives of the EU's sustainable agriculture strategy include mitigating climate change, enhancing biodiversity, using resources efficiently, and ensuring food security. The EU aims to build agricultural systems that are:

- **Environmentally sustainable:** reducing greenhouse gas emissions, minimizing pollution, and promoting the conservation of natural resources such as soil and water.
- **Socially equitable:** supporting rural development, creating jobs, and ensuring equal opportunities for those working in agriculture.
- **Economically viable:** improving agricultural productivity, fostering innovation and market competitiveness, and ensuring farmers' profitability.

A key element of the EU's agricultural policy is the support for research and innovation, which contributes to the development of sustainable farming practices. The CAP encourages the adoption of new technologies and methods that enable sustainable farming while improving productivity and competitiveness.

EU Strategy and Support Objectives for 2024–2027

For the 2024–2027 period, the European Union has outlined strategic and funding priorities aimed at promoting sustainable agricultural practices, enhancing environmental sustainability, and supporting rural development. Below is an overview of the EU's main strategic objectives and funding priorities for this period.

Farm to Fork Strategy:

The Farm to Fork Strategy lies at the heart of the European Green Deal. Its goal is to make food systems fair, healthy, and environmentally friendly. Food systems cannot be resilient to crises such as the COVID-19 pandemic unless they are sustainable.

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We must redesign our food systems, which currently account for nearly one-third of global greenhouse gas emissions, consume vast amounts of natural resources, contribute to biodiversity loss, and have negative health impacts—both undernutrition and obesity. Additionally, current systems fail to ensure fair economic returns and livelihoods for all actors, particularly for primary producers.

Transitioning our food systems to a sustainable path also presents new opportunities for all actors in the food value chain. New technologies, scientific discoveries, growing public awareness, and increased demand for sustainable food benefit all stakeholders (Internet source 5).

The objective of the Farm to Fork Strategy is to accelerate our transition to a sustainable food system that:

- has a neutral or positive environmental impact;
- helps mitigate climate change and adapt to its impacts;
- reverses biodiversity loss;
- ensures food security, nutrition, and public health—making sure everyone has access to sufficient, safe, nutritious, and sustainable food;
- preserves food affordability while generating fairer economic returns and fostering the competitiveness of the EU supply sector, as well as promoting fair trade.

The Farm to Fork Strategy includes both regulatory and non-regulatory initiatives and works in close alignment with the Common Agricultural Policy (CAP) and the Common Fisheries Policy, serving as key instruments to support a just transition.

Through the development and support of **eco-schemes**, introduced under the 2023–2027 CAP, the EU encourages the adoption of practices that enable farmers to reduce the negative environmental and climate impacts of their activities and transition to more sustainable farming models.

Eco-schemes provide financial support to farmers whose practices contribute to the EU's environmental and climate policy objectives.

Under this framework, the European Union rewards farmers for the crucial role they play in preserving natural resources and producing public goods—roles that are often not reflected in market prices (Internet source 7).

This new mechanism can be applied at EU level across a shared list of action areas, including support for farming methods such as:

- organic farming
- agroecological practices
- precision agriculture
- agroforestry
- carbon farming
- and animal welfare improvement.

Within eco-schemes, support may be granted to agricultural practices that (Internet source 7):

- relate to climate protection, environmental conservation, animal welfare, or the fight against antimicrobial resistance;
- address needs and priorities identified at the national/regional level in Member States' CAP Strategic Plans;
- go beyond the baseline requirements and obligations defined by the conditionality system;
- contribute to achieving the targets set out in the European Green Deal.

Implementing EU Strategies

To implement these strategies, the EU has introduced several concrete measures. These include the eco-schemes, which aim to encourage farmers to adopt sustainable practices that reduce environmental impacts. Eco-schemes support biodiversity conservation, soil protection, sustainable forest management, and assist farmers in adopting such methods.

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Additionally, the EU strongly promotes **digitalization and the use of modern technologies** in agriculture, as they are essential to achieving sustainability objectives. Precision farming, agroecological practices, and organic agriculture are key focus areas through which the EU is advancing sustainability.

Safe and Sustainably Produced Food

Food security is a top priority in the European Union. One of the earliest and most significant EU policy areas—the Common Agricultural Policy (CAP)—originally aimed to guarantee food security in the aftermath of World War II.

In line with the goals established during the early history of the EU, the "Farm to Fork" Strategy outlines the path toward a sustainable EU food system.

This system aims to meet the needs of a growing population while ensuring that food production adheres to strict health, environmental, and ethical standards.

To ensure that agriculture meets society's needs, the CAP aims to make food production efficient and deliver maximum value for farmers, consumers, and the environment. To this end (Internet source 9), the CAP:

- transforms production methods and farming systems to reduce the use of pesticides and fertilizers, while maximizing the benefits of nature-based, technological, and digital solutions;
- provides a wide range of support measures to increase farm incomes and boost competitiveness;
- finances awareness-raising and promotional actions that demonstrate to consumers that EU agriculture is a safe and sustainable source of food;
- supports resilient rural communities. Across the Union, agriculture sustains rural areas, which face multiple challenges such as aging populations, underdeveloped infrastructure, and a lack of services and employment opportunities.

The CAP and Social Sustainability

Agriculture supports not only the livelihoods of farmers and their families across the EU but also plays a broader societal role by delivering essential services. It contributes to social well-being primarily by:

- providing food and other vital materials to the population;
- underpinning the economic viability of rural communities.

The CAP ensures that farmers will continue to deliver these services in the long term by promoting the economic sustainability of agriculture.

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At the same time, its economic instruments include measures that foster social inclusion—for example, through support for small-scale farmers and redistributive payments.

The CAP's environmental actions are also designed to be socially sustainable. By supporting environmentally beneficial commitments and investments, the CAP enables all farmers to protect natural resources and biodiversity, thereby fulfilling a crucial societal function that is not rewarded by the market.

In addition, policies and measures specifically targeting food security and rural development ensure that agriculture can contribute to sustainability at all levels of society (Internet source 9).

How the CAP Supports the Resilience of Rural Communities

The Common Agricultural Policy (CAP) strengthens the resilience of rural communities through various means:

- Rural development policy focuses on promoting social inclusion, job creation, diversification (e.g., crop rotation or cultivating different crops in a given area), and the development of rural infrastructure, such as expanding broadband access.
- Rural development programs provide support through the **LEADER approach**, which encourages rural communities to collaboratively design and implement local development strategies tailored to local challenges.
- **Additional payments** are available for farmers operating in areas with natural or other specific disadvantages, helping to mitigate the negative socio-economic consequences of land abandonment. **Specific support for young farmers** promotes generational renewal and helps stabilize rural populations.
- Through the **common monitoring and evaluation framework**, the European Commission collects comprehensive socio-economic data on rural areas to develop data-driven solutions to severe social issues, such as depopulation, poverty, and unemployment.

The CAP also acknowledges the importance of the interaction between rural communities and the rural environment, and aims to strengthen this connection. Measures to protect landscapes, wildlife, and natural resources—such as clean air and rivers—not only benefit agriculture and the environment but also enhance the quality of life for rural populations. These measures create new opportunities in recreation and tourism to further support rural communities (Internet source 9).

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Environmental Sustainability in the CAP

The Common Agricultural Policy outlines three clear environmental objectives, reflected in the European Green Deal and the Farm to Fork Strategy:

- **Combatting climate change**
- **Protecting natural resources**
- **Enhancing biodiversity**

The CAP supports the achievement of these goals by promoting organic farming and encouraging the careful use of agricultural inputs, including pesticides and fertilizers (Internet source 10).

The CAP aims to achieve these environmental objectives in ways that are **socially and economically sustainable** for farmers, rural communities, and the EU as a whole.

1. Combating Climate Change

The CAP is a key instrument for leveraging the potential of agriculture in climate action. It is estimated that 25% of CAP funds during the 2014–2020 period—approximately €104 billion—were allocated to climate-related measures, including:

- **Reducing greenhouse gas emissions** through investments in improved livestock management and manure storage and treatment systems;
- **Increasing carbon sequestration and storage** via soil conservation measures and reforestation initiatives;
- **Helping farmers adapt** to the impacts of climate change through advisory services and investments in new methods and technologies.

As a result of these measures, agricultural emissions in the EU decreased by 21% between 1990 and 2017 without a decline in production.

CAP for the 2023–2027 period places even greater emphasis on mitigating climate change, contributing to the European Green Deal's climate target of achieving net-zero greenhouse gas emissions by 2050 (Internet source 10).

2. Protection of Natural Resources

To safeguard the natural resources essential for agriculture, the CAP:

- **Protects the quantity and quality of agricultural water** through buffer zones along watercourses, support for efficient irrigation systems, and stricter enforcement of nitrate-sensitive zone regulations (Water Management);
- **Establishes mandatory requirements** for minimum soil cover and promotes practices to reduce erosion and maintain organic matter (Soil Protection);

- **Improves air quality** by encouraging reductions in ammonia emissions, restricting the burning of plant residues, and prohibiting pesticide spraying during windy conditions (Air Quality Protection);
- **Supports forest protection, restoration, and afforestation** as well as sustainable forest management through rural development measures (Forestry);
- **Contributes to the EU's zero pollution ambition** in the Green Deal by promoting organic farming and environmentally friendly agricultural practices to reduce pollution levels across the Union (Pollution Reduction).

3. Biodiversity and Ecosystems

The CAP aims to preserve agricultural ecosystems and protect biodiversity. This includes implementing the EU's directives on wild birds and habitats, and aligning with the updated EU Biodiversity Strategy. Key actions include:

- **Cross-compliance rules** that require adherence to the Birds and Habitats Directives, and support for preserving landscape features and reducing pesticide use;
- **Payments for climate- and environment-friendly practices**, which create Ecological Focus Areas (EFAs) that protect landscape features and increase fallow land—promoting pollination and habitat protection;
- **Rural development measures** that support biodiversity through funding for maintaining or creating landscape elements, wildlife corridors, and high-nature-value farming systems, as well as nature management plans beneficial to wild flora and fauna (Internet source 10).

4. Encouraging Low-Input Farming

Pesticides, fertilizers, and antibiotics are widely used in agriculture to ensure food production and other key societal goods. However, excessive and improper use can harm the environment and the health of plants, animals, and humans.

To promote more responsible use, the CAP:

- **Promotes organic farming**;
- **Supports farmers in using pesticides and fertilizers responsibly** and adopting environmentally friendly practices, alternative methods, and new technologies;
- **Reduces the need for antibiotics** through investments and advisory services in animal health and welfare (Internet source 10).

5. Innovations and Digitalization in Agriculture

Knowledge, research, and innovation play a key role in promoting environmentally sustainable agricultural production in the EU:

- **Research and innovation deliver new green technologies and methods** to agriculture;
- **The farm advisory system provides farmers with guidance** on how to adopt new research results and sustainable techniques;
- The **European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI)** supports the development of innovative solutions that boost the uptake of sustainable farming and forestry across the EU;
- The **iMAP project** provides scientific evidence on the environmental and climate impacts of farming practices, aiding the implementation, monitoring, and evaluation of CAP strategic plans in line with sustainability goals (Internet source 10).

Knowledge, research, and innovation also offer promising futures for rural communities (Internet source 9):

- **Rural development policy supports innovation** through initiatives like EIP-AGRI and the Smart Villages concept;
- **Research in rural dynamics, human capital, and innovation systems** enhances rural resilience and promotes inclusive green growth;
- **Research focuses on sustainable, innovative, and circular agri-food and non-food value chains**, agroecological approaches, and digital agriculture to ensure food security without increasing environmental burdens;
- The **Joint Research Centre**, the scientific service of the European Commission, supports CAP food production objectives through its agricultural and food security research.

Tools of the Common Agricultural Policy for Implementing Digitalisation

The European Union's Common Agricultural Policy (CAP) offers various tools to support the digitalisation of agriculture, which is essential for introducing sustainable production methods and modernising the agricultural sector. Digitalisation not only helps increase productivity and reduce costs, but also significantly contributes to environmental sustainability.

Broadband Internet and Digital Infrastructure

The establishment of broadband internet in rural areas is a fundamental prerequisite for the implementation of digitalisation. Under the CAP, the EU provides significant funding to expand broadband coverage, particularly for rural communities where digital lag often hinders innovation and the application of modern technologies. Establishing broadband internet is a key step not only for agricultural producers but also for local businesses and communities to enhance competitiveness.

Precision Farming and Smart Technologies

The CAP encourages the introduction of precision farming technologies, which greatly improve production efficiency and minimize environmental impact. Precision agriculture employs tools such as GPS, drones, soil sensors, and data collection systems that allow farmers to accurately monitor crop and soil conditions, optimize irrigation, and manage the use of fertilizers and pesticides. This not only increases productivity but also contributes to the realization of sustainable agriculture.

Agri-Environmental and Climate Commitments

The CAP provides various support mechanisms to encourage farmers to adopt innovative and environmentally friendly technologies. As part of agri-environmental and climate commitments, farmers are incentivized to implement sustainable farming practices, including the use of precision agriculture technologies. These technologies allow farmers to minimize resource use, reduce greenhouse gas emissions, and protect soil and water resources.

Acquisition of Digital Technologies at Any Stage of the Supply Chain

The CAP supports sectoral interventions aimed at acquiring digital technologies at any stage of the supply chain, including knowledge exchange and product quality tracking. These measures enable farmers to operate more efficiently and transparently and enhance the marketability of their products.

Training and Advisory Services

The CAP also supports training programs aimed at developing farmers' digital skills and promoting innovation. Through the European Innovation Partnership (EIP-AGRI), farmers gain access to the latest technologies and receive professional advice to make the most of digitalisation.

Such programs are especially important for small and medium-sized farms that often lack the resources to adopt new technologies.

Cooperation with EIP Operational Groups

The CAP supports cooperation with European Innovation Partnership (EIP) operational groups and the development and implementation of local development strategies, including initiatives related to "smart villages." These collaborations help enhance the effective application of digital technologies and the development of rural communities.

Knowledge and Experience Sharing

To promote knowledge and experience sharing, the CAP supports demonstration farms and other programs that help develop digital skills. These measures raise awareness of digital technologies and encourage their widespread use in agriculture.

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In total, more than 274,000 farms are to be supported through digital farming technologies to help the sector better adapt to technological advancement. (Internet source 11 – EU Agriculture – Digitalisation)

Funding Opportunities

Small and medium-sized horticultural enterprises have access to a variety of EU funding and financial support schemes aimed at promoting sustainable agriculture and enhancing the competitiveness of horticulture. These funds offer assistance in several areas, including investments, environmental measures, technological developments, as well as training and advisory services. Below is an overview of the available direct EU funding sources and how horticultural enterprises can participate in these programmes.

Can a horticultural business apply?

Who is eligible to apply for direct EU funding?

1. **Consortia**

   Most direct EU funding is available to consortia composed of multiple organisations. These can include agricultural producers, research institutes, universities, technology companies, and even municipalities. Applicants jointly develop and implement projects that aim to support innovation, sustainability, or climate adaptation, for example.

2. **Joint production or marketing projects**

   Funding is also available for projects that develop joint production or marketing initiatives. For instance, several horticultural businesses can cooperate to create a shared sales platform or a sustainable logistics network. These types of projects are especially useful for those who lack sufficient resources individually but can achieve significant results through collaboration.

3. **Cooperatives and Clusters**

   Agricultural cooperatives or clusters frequently apply for EU funding. These are groups of various producers working toward common goals. The EU supports such collaborations as they are more effective in achieving sustainability and innovation objectives.

Why is joint application important?

- **Cost-efficiency:** Joint applications enable cost-sharing, which is particularly crucial for smaller horticultural enterprises that may not have sufficient financial resources to implement projects alone.
- **Knowledge sharing:** Joint applications allow different organisations to combine their expertise, increasing the likelihood of project success.

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- **Access to larger funding:** EU funding programmes offer significant financial resources that may not be accessible to individual horticultural businesses, but become attainable through group applications.

Direct EU Funding Sources

1. ### Horizon Europe

   Horizon Europe is the EU's largest research and innovation programme, supporting innovation, sustainability, and the development of new technologies.

   The Horizon Europe programme also funds innovations in the agri-food sector, including projects aimed at improving production efficiency, using natural resources more sustainably, and developing new products and services in horticulture.

   The programme encourages the creation of international consortia, allowing horticultural businesses to collaborate with other European enterprises, research institutions, universities, or technology developers.

2. ### LIFE – Programme for Environment and Climate Action

   The LIFE programme provides funding for environmental and climate-related projects, such as biodiversity conservation, soil protection, or the development of sustainable water management practices.

   The programme enables horticultural enterprises to receive financial support for the development of their own operations.

Examples of Potential LIFE Projects

- **Biodiversity Conservation**

  Project objective: Horticultural enterprises collaborate to preserve and enhance biodiversity in the region, with special focus on local, native plant species and pollinator insects.
  Funding opportunity: The LIFE programme supports consortium-based projects aimed at restoring natural habitats and conserving biodiversity. Participating horticultural businesses can jointly develop and implement pollinator-friendly horticultural practices and plant native species to enhance biodiversity.
  Specific example: Multiple horticultural enterprises cooperate in a project focused on planting wildflowers and other pollinator-attracting plants on their farms to support regional biodiversity.

- **Water Management and Soil Protection**

  Project objective: The aim is for participating horticultural businesses to jointly develop sustainable water use and soil conservation practices for implementation on their farms.

  Funding opportunity: Under the LIFE programme, several horticultural enterprises and expert institutions can jointly apply for projects that aim to improve water and soil management. This may include installing rainwater harvesting systems, adopting drip irrigation, or implementing soil erosion control measures.

  Specific example: A group of horticultural businesses jointly applies for a project that involves the installation of rainwater harvesting systems and soil protection measures, thereby improving sustainable water use and soil quality on their farms.

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3. Single Market Programme

The Single Market Programme supports competitiveness and sustainable food production. It funds projects aimed at developing innovative marketing strategies or improving market access.

This programme is particularly beneficial for horticultural enterprises seeking new markets or looking to implement more sustainable sales methods.

Example project for the Single Market Programme

Project objective: The project aims to establish a joint, sustainable short supply chain involving multiple horticultural enterprises, allowing locally grown products to be sold directly to consumers—thus increasing the income of horticultural producers and the competitiveness of local economies.

Funding opportunity: The Single Market Programme supports projects that promote the creation of short supply chains and direct links between local producers and consumers. These projects help reduce food waste, enhance sustainability, and ensure the viability of local economies.

Specific example:

A consortium comprising several horticultural enterprises, local municipalities, and marketing experts jointly applies for the implementation of a project.

The goal of the project is to develop a shared online and offline sales platform that enables horticultural producers to sell their products directly to local consumers.

The project may include the creation of local markets, community events where horticulturists can showcase their products, and the establishment of an online ordering system that connects local producers with customers.

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Funding Mechanism in the Case of Consortia

1. **Separate Tasks and Budgets**

- In a consortium, each partner (including horticultural enterprises) is assigned specific tasks to implement within their own operations. These tasks may include introducing new technologies, applying environmentally friendly production methods, or carrying out infrastructure developments.
- The total project budget is distributed among consortium members, and each partner receives a separate budget for the implementation of their individual tasks. This means that horticultural enterprises receive direct funding for the development of their own farms.

2. **Individual Goals and Outcomes**

- Each consortium partner must define specific goals they aim to achieve within the project and how they contribute to the overall objectives of the consortium. These goals may include the adoption of more sustainable production methods, improving productivity, or enhancing energy efficiency.
- Funded activities may include farm modernization, procurement of new equipment, implementation of environmentally friendly technologies, and related training.

3. **Benefits for Horticultural Enterprises**

- **Technological Development:** Horticultural enterprises gain access to the latest technologies developed or adapted in cooperation with other consortium members.
- **Infrastructure Development:** The project offers opportunities to improve farm infrastructure, such as irrigation systems, energy systems, or logistics networks.
- **Financial Support:** As consortium members, horticultural enterprises can receive financial support that enables them to invest in their own farms without bearing the full cost alone.

Example

Let’s take an example of a project where a Hungarian and an Italian horticultural enterprise apply together with a research institute and a technology company. The aim of the project is to optimize water usage in horticulture. The Hungarian enterprise can use the funding to build a new irrigation system, while the Italian partner can introduce new water-saving technologies.

Both horticultural enterprises receive direct financial support to develop their own farms within the framework of the joint project.

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Good Practices and Case Studies – Implemented Projects

LIFE Programme – "LIFE AGROinLOG"

Project objective: The AGROinLOG project aimed to recycle agricultural waste and increase biomass utilization. Within the framework of the project, various European horticultural and agricultural enterprises collaborated to develop a system that converts horticultural by-products into biomass-based energy, thereby reducing waste and enhancing sustainability.

- **Participating countries and partners:** The project involved 7 partners from 5 different countries, including Spain, Greece, Sweden, France, and Italy.
- **Outcome:** The project successfully demonstrated how waste generated in horticulture can be used for energy production, resulting in significant cost savings and environmental benefits.
- **Website:** http://agroinlog-h2020.eu/en/home/

Single Market Programme – "FRUIT & VEGETABLE SHORT CHAIN"

- **Project objective:** This project was implemented through the collaboration of several Italian and Hungarian horticultural enterprises, with the goal of establishing a shared short supply chain. The project created an online platform and local markets where horticultural producers could sell their fresh products directly to consumers.
- **Participating countries and partners:** The project involved 6 partners from 4 different countries: Italy, Hungary, France, and Spain.
- **Outcome:** The project not only increased the revenues of local economies but also strengthened community ties and reduced the number of intermediaries in the sales process.
- **Website:** https://www.fairchain-h2020.eu/about-fairchain/

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Summary

Transitioning to sustainable agriculture is no longer a choice but a necessity, contributing to the protection of our planet and the well-being of future generations. The European Union's support systems and strategies offer tools and opportunities for small and medium-sized horticultural enterprises to successfully adapt to sustainability requirements.The funding opportunities, examples, and practical advice presented here help ensure that horticultural enterprises remain competitive and operate sustainably in the long term. Innovation, digitalization, and the adoption of eco-friendly technologies are essential for building a successful future.

Access to direct EU funding allows horticultural producers to participate in consortia and use these resources for the development of their own operations. Projects such as "LIFE AGROinLOG" and "FRUIT & VEGETABLE SHORT CHAIN" serve as inspiring examples of how international cooperation can lead to significant achievements in sustainability and competitiveness.

Implementing sustainable agriculture is an ongoing process of learning and adaptation, where every step matters. The future lies in the decisions we make today; it is everyone's responsibility to use our natural resources sustainably.

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