VALERECO

Valorization Legumes Related Ecosystem Services

D1.3: Entry points of the new CAP for the integration of legume ecosystem services

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Executive Summary

This document provides a comprehensive analysis of the Common Agricultural Policy (CAP) framework, highlighting its objectives, funding allocations, and various types of subsidies. It begins with an introduction that sets the stage for understanding the broader context and significance of the CAP.

The second chapter explains the general framework of the CAP by listing its objectives, including agricultural sustainability, fair income for farmers, and rural development. After the allocation of funds, comes the distribution of financial resources against various initiatives. Other important subsidies discussed in this report include coupled income support, sectoral interventions, investment subsidies, and eco-schemes, all of which support farmers and promote environmental sustainability.

Chapter three focuses on the penetration of ecosystem services, especially the challenges and opportunities related to the adoption of leguminous crops. Several barriers to adoption have been identified, including issues related to yield, climate change, economic constraints, lack of knowledge, and market barriers. Each of these barriers is examined in detail to understand their impact on the adoption process.

In the face of these barriers, the document points out several gateways to improving the penetration of leguminous crops: increased R&D, supportive environmental policies, targeted subsidies, better knowledge and training programs, market development, business digitalization, and diversification/differentiation of products. These strategies are aimed at facilitating the integration of leguminous crops into mainstream agriculture by addressing the specific challenges faced by farmers.

The conclusion of the document then summarizes the key findings, providing recommendations for future actions. The emphasis is placed on having a holistic approach to enhancing agroecological practices and improving the adoption of sustainable agricultural methods. The present report will be a useful contribution to policymakers, researchers, and practitioners in the agricultural sector for the effective implementation of the CAP and promotion of sustainable farming practices. By addressing challenges and opportunities for adoption, it provides a roadmap toward a more sustainable and resilient agricultural system.

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List of abbreviations

CAP	Common Agriculture Policy
EU	European Union
CIS	Coupled Income Support
EAGF	European Agricultural Guarantee Fund
EAFRD	European Agricultural Fund for Rural Development
R&D	Research & Development
Mha	Million hectares
IPM	Integrated Pest Management
GHG	Greenhouse Gas
AKIS	Agricultural Knowledge and Innovation Systems
NSP	National Strategic Plan
AMR	Antimicrobial Resistance
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
GAEC	Good Agricultural and Environmental Condition
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale
UAA	Utilized Agricultural Area
EFA	Ecological Focus Area
IEEP	Institute for European Environmental Policy

1. Introduction

Agriculture is a cornerstone of the European Union (EU), playing a crucial role in food production, fostering rural development, and ensuring environmental sustainability. Since its creation in 1962, the Common Agricultural Policy (CAP) has remained a key framework guiding European agriculture. The CAP has been instrumental in supporting farmers, promoting sustainable agricultural practices, and ensuring an affordable and consistent food supply for millions of citizens (European Commission, 2021). Over the decades, this policy has undergone numerous reforms to adapt to evolving economic, social, and ecological challenges. This document examines the CAP framework, its objectives, funding mechanisms, key subsidy programs, and its role in fostering ecosystem services, particularly through leguminous crops.

The CAP's strategic framework focuses on several important objectives: ensuring food security, stabilizing agricultural markets, supporting farmers' incomes, encouraging sustainable agricultural methods, and promoting rural development (Magrini et al., 2016). These objectives are achieved through financial support and regulatory frameworks. The CAP is structured around two distinct pillars. Pillar I centres on direct payments to farmers and market-related measures aimed at stabilizing incomes and ensuring market efficiency. Pillar II focuses on rural development, promoting long-term social, economic, and environmental sustainability in rural areas.

One of the most impactful elements of the CAP is its subsidy system, which provides financial incentives to encourage both productivity and sustainability among farmers. Among the key subsidy programs are Coupled Income Support (CIS), sectoral interventions, investment subsidies, and eco-schemes. CIS directly links payments to specific agricultural products, offering targeted support to sectors facing challenges (European Commission, 2021). Sectoral interventions enhance both productivity and sustainability within specific agricultural domains. Investment subsidies enable farm modernization, improve infrastructure, and encourage the adoption of innovative practices. Eco-schemes incentivize farmers to implement environmentally friendly techniques, such as biodiversity conservation, organic farming, and soil health improvement measures.

Another critical aspect of the CAP framework is its emphasis on ecosystem services, which are essential for sustainable agriculture. These services include improving soil fertility, regulating water resources, and enhancing biodiversity. Leguminous crops, in particular, are prioritized due to their ability to naturally fix nitrogen, improve soil health, and reduce dependency on chemical fertilizers (Pretty et al., 2018). However, despite these advantages, the widespread adoption of legumes faces several interconnected barriers. These challenges include relatively lower yields compared to conventional crops, susceptibility to climate variability, financial constraints, a lack of farmer knowledge, and an underdeveloped market and infrastructure to support legumes.

To overcome these barriers, several strategies are required. Investments in research and development (R&D) can lead to the creation of high-yielding, climate-resilient legume varieties. Simultaneously, the development of supportive environmental policies will encourage the adoption of sustainable farming practices. Financial incentives, including targeted subsidies, can lower the economic barriers to legume adoption, while training programs and extension services can bridge farmers' knowledge gaps (Magrini et al., 2016). Additionally, efforts to develop market infrastructure, raise consumer awareness, promote legume-based value-added products, and leverage digital technologies for farm optimization would greatly enhance penetration. Diversification and differentiation of products could further provide farmers with new opportunities to generate income while adhering to sustainable practices.

In conclusion, the CAP framework represents an indispensable policy tool for shaping the future of European agriculture. By simultaneously addressing barriers to adoption and promoting pathways for sustainable farming, such as expanding leguminous crops, the CAP plays a critical role in balancing ecological stewardship, economic sustainability, and food security. It remains a dynamic, evolving policy designed to respond to emerging regional and global challenges. As the CAP continues to adapt, its ability to inform regional and national decision-making processes—grounded in economic and environmental indicators—ensures its relevance and effectiveness in fostering legume adoption and advancing the EU's sustainability goals over the long term.

2. General CAP’s framework

2.1 CAP’s Objectives: At a Glance

The CAP has 10 objectives related to social, environmental, and economic parameters, forming the foundation of each EU country’s strategic plan. The 10 objectives of CAP for the period 2023 – 2027 consist of:

Support of farmers income. The CAP ensures stable and equitable incomes for farmers through comprehensive support mechanisms that offset production costs and maintain adequate living standards. Direct payments serve as a crucial stabilizing force against market volatility, providing essential financial security during periods of price depression. This support framework proves particularly vital for small-scale and family-operated farms, ultimately strengthening the agricultural sector's resilience. For instance, in Germany, the CAP 2023–27 plan earmarks about €2.5 billion in basic income support, covering approximately 16.9 Mha, plus a redistributive top-up payment for farms up to 60 ha. As result, smaller and medium farms receive proportionally higher support (European Commission, 2024, At a glance: Germany's CAP Strategic Plan). In the 2024 financial year EU-wide, CAP direct payments reached 5.6 million farms, totalling €36.9 billion, and roughly 44% of EU farmland now benefits from redistributive payments, about 8% higher support per hectare, helping to stabilise farm incomes (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Enhancement of farm competitiveness. To boost EU agricultural competitiveness, the CAP facilitates investments in cutting-edge technology, innovation, and sustainable practices. This objective encompasses substantial funding for research and development initiatives, while promoting the adoption of digital solutions and precision farming methodologies. These strategic investments enhance operational efficiency and reduce production costs, enabling European farmers to maintain a stronger position in global markets. For instance, in Greece, 1.59% of farms will receive support for restructuring and modernisation, while 17.5% are targeted for digital technology adoption. Additionally, over €1 billion in EU funds is allocated to investment measures (INVEST) under rural development, aligned with the competitiveness objective (European CAP Network 2024, CAP Strategic Plan Factsheet: Greece).

Strengthening farmers position in food value chain. The CAP actively reinforces farmers' bargaining position within the agricultural supply chain through strategic interventions. Central to this approach is the promotion of cooperatives and producer organizations, enabling collective resource management and enhanced price negotiation capabilities. The policy framework implements measures to improve market transparency and fairness, ensuring farmers receive an equitable share of food chain value generation. In Spain, the CAP strategic plan supports 13.6% of farms to join producer organisations, quality schemes, or short supply chains (European CAP Network 2024, CAP Strategic Plan Factsheet: Spain). The approved plans foresee to grant support to 760.000 farms to participate in producer groups and organisations, short supply circuits and quality schemes (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Climate change mitigation. Recognizing agriculture's role in greenhouse gas emissions, the CAP implements comprehensive measures to reduce environmental impact while developing climate-resilient farming practices. The framework emphasizes sustainable land management principles, soil health enhancement, and renewable energy integration. These agricultural policy initiatives directly support broader EU environmental objectives and climate action goals. For example, Germany exceeded its 2024 target by enrolling 110,000 hectares in agri-environment-climate measures aimed at improving carbon storage through grassland extensification, peatland management, and permanent pasture. In Poland, the "Carbon farming and nutrient management" eco-scheme supported 10.5 million hectares with practices like catch crops, reduced tillage, and fertilization plans to enhance soil organic matter and reduce emissions (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Natural resource management. The CAP implements environmental schemes that incentivize sustainable resource utilization while protecting biodiversity. Financial support extends to organic farming initiatives and agri-environmental programs, with particular emphasis on water quality preservation and soil health maintenance. This approach enhances environmental multifunctionality of agricultural lands, ensuring sustained productive capacity. Under CAP 2023–2027, Spain implemented multiple eco-schemes, including “Carbon farming and agroecology,” “Green covers in permanent crops,” and “Extensive grazing and mowing”, which together cover 48% of Spain’s agricultural land with practices that enhance soil health, prevent erosion, and maintain ground cover (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Biodiversity protection. Through targeted initiatives, the CAP promotes agricultural practices that conserve traditional landscapes and protect vital wildlife habitats. The policy emphasizes the maintenance of critical landscape features such as hedgerows and stone walls, which serve as essential habitats for diverse species. These biodiversity-friendly farming approaches strengthen ecological integrity across rural landscapes. In Slovenia, 22% of agricultural land is managed under interventions directly targeting biodiversity and landscapes —surpassing national milestones for 2024. This includes 12,600 hectares of “Special grassland habitats”, 4,600 hectares supporting “Coexistence with large carnivores”, and 1,400 hectares of traditional “Dry karst meadows and pastures.” Slovenia also implemented a result-based eco-scheme to protect lapwing nests, successfully preserving 146 nests (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Generational renewal. Addressing the challenge of an aging agricultural workforce, the CAP provides comprehensive support for young farmers and new entrants through targeted financial assistance, specialized training programs, and facilitated access to land and credit resources. These measures ensure agricultural sector continuity and innovation through effective generational transition. By 2024, the CAP 2023–2027 supported the installation and income of nearly 164,000 young farmers across the E, including 55,300 young women, significantly exceeding initial targets for the second year of implementation. This was achieved through start-up grants, top-up payments, and training programmes, reflecting the CAP's priority to reverse rural aging and foster a new generation of farmers (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Rural development and employment. The CAP actively promotes rural vitality through targeted support mechanisms that enhance economic opportunities and social equality in rural areas. The policy framework facilitates infrastructure development, community engagement, and diversification of rural economies, creating sustainable employment opportunities beyond traditional farming activities. By 2024, approximately 2,700 Local Development Strategies were approved under the LEADER initiative, and many Local Action Groups (LAGs) had already begun implementing projects. The LEADER initiative is a European programme empowering rural communities to develop their regions via LAGs. Its network now involves over 120,000 local stakeholders, supporting rural revitalization through investments in basic services, community projects, and local economic diversification (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Food safety and societal health demands. Through rigorous quality control measures and inspection protocols, the CAP maintains exceptional food safety and quality standards across the EU. The policy promotes sustainable and ethical farming practices while ensuring strict regulatory compliance. This comprehensive approach protects consumer health while enhancing the global reputation of EU agricultural products. By 2024, the CAP supported over 22 million livestock units (20% of EU total) with animal welfare improvements, and more than 16 million livestock units (16.3%) benefited from antimicrobial resistance (AMR) reduction measures. In Finland, nearly 94% of livestock units are covered by 21 CAP-supported animal welfare actions, including improved housing and biosecurity. Sweden implemented species-specific interventions for cows, sows, and sheep, reaching 18% of livestock units (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Innovative knowledge transfer. CAP fosters continuous improvement through knowledge sharing and innovative practice adoption within the agricultural sector. The framework supports comprehensive agricultural education programs, extension services, and knowledge transfer networks. This culture of innovation and learning enhances farmer productivity, sustainability, and adaptability to changing conditions. By 2024, CAP Strategic Plans funded 317,000 participants in training, advisory services, and knowledge exchange activities across the EU. Additionally, 4,000 farm advisors were supported to strengthen their integration into Agricultural Knowledge and Innovation Systems (AKIS). In Austria, a rural women's cooperative established a "Centre of Excellence for Women's Health" with CAP support, offering regular training on economic resilience and leadership in rural areas, a model of community-driven knowledge dissemination (European Commission 2025, The 28 CAP Strategic Plans underway: summary of implementation in 2023-24).

Figure 1: CAP's objectives (European Commission, 2023)

2.2 Funds allocation

The objectives described above make up the framework of the new CAP for the period 2023 – 2027 and constitute the key to the strategic plan preparation. It is essential to examine the economic aspect of the CAP in greater detail. As shown in the following diagrams, the EU CAP funds two pillars with a total budget of €386.6 billion. (European Commission, 2023)

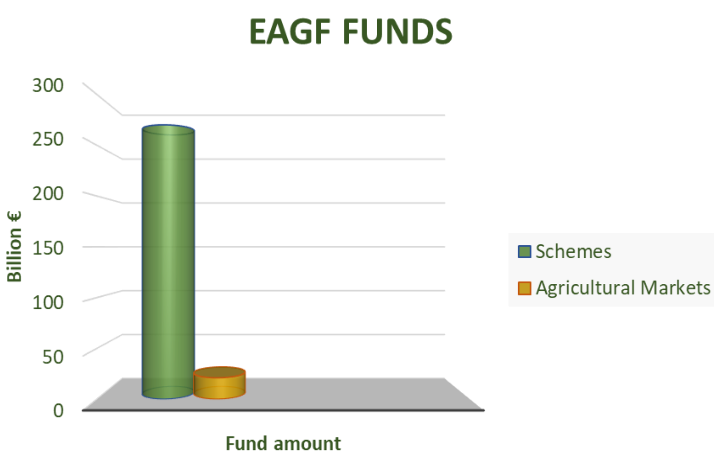

Figure 3: EAGF Funds

First pillar: European Agricultural Guarantee Fund (EAGF). This pillar commands €291.1 billion, with a strategic distribution: 92.75% (€270 billion) supports direct scheme implementation, while 7.24% strengthens agricultural markets. Market support mechanisms enhance farmers' value chain position through producer group participation and quality scheme engagement (European Parliament, 2023).

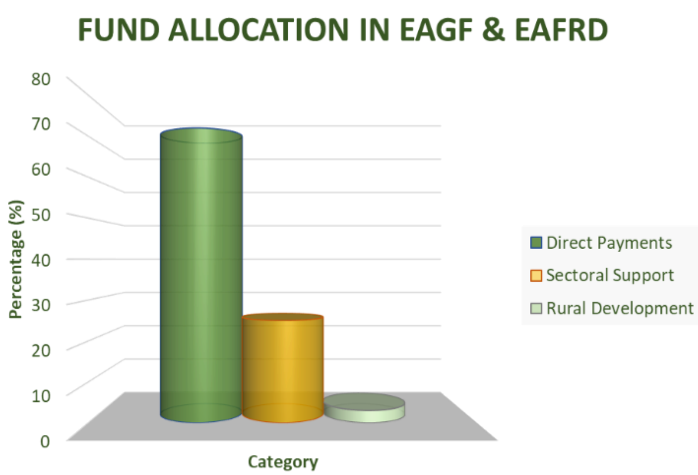

Figure 3: Fund Allocation in EAGF & EAFRD

Second Pillar: European Agricultural Fund for Rural Development (EAFRD). With a total allocation of €95.5 billion, including €8.1 billion from the COVID-19 recovery instrument, this pillar focuses on agricultural competitiveness, sustainable resource management, and rural development initiatives across the EU. (European Commission, 2023).

Building on previous CAP frameworks, 30% of funding is dedicated to environmental and climate change initiatives, while 5% supports local development projects (EU – Lex, 2023).

The EU CAP distributes its total funding across three primary categories: Direct Payments, Rural Development, and Sectoral Support. The allocation comprises 72% for direct payments, 25% for rural development initiatives, and 3% for sectoral support measures (European Commission, 2023). Direct payments primarily assist farmers facing income challenges, particularly those earning below-average returns or confronting obstacles such as pest infestations, disease outbreaks, adverse weather conditions, and market volatility. Rural development funding encourages the adoption of agro-environmental practices and strengthens risk management capabilities (European Parliament, 2023).

Sectoral support complements these measures by promoting sustainable and resilient food systems through targeted producer incentives (EU CAP Network, 2023).

This comprehensive economic support framework, implemented through strategic plans, aims to enhance farmer resilience across all agricultural sectors in an increasingly unpredictable environment (European Commission, 2023).

2.3 Subsidies

The CAP 2023-2027 marks a significant shift in funding distribution, prioritizing smaller agricultural operations through payment reallocation from larger enterprises. This reform introduces increased direct payments, featuring a 16% rise in per-hectare payments compared to previous periods, primarily benefiting small-scale farmers. Through coupled income support, the EU targets assistance to 21% of farms across 18 sectors, with particular emphasis on leguminous crop production to decrease dependence on nitrogen fertilizers and protein imports, thereby strengthening food security. This strategic focus has resulted in a 25% increase in support for leguminous and protein crops, with an ambitious target of 7 million hectares under cultivation by the period's end (European Commission). Additionally, substantial investment in modernization initiatives aims to enhance agricultural productivity through advanced technologies, focusing on improved fertilization methods, biomass processing efficiency, and optimized energy utilization (European Commission, 2023).

2.3.1 Coupled Income Support (CIS)

While the European Union seeks to decouple most product subsidies, the Coupled Income Support remains vital for sectors facing specific challenges. This targeted support mechanism acknowledges these sectors' crucial social, economic, and environmental contributions. Through CIS, the EU aims to enhance product competitiveness while ensuring high-quality, sustainable production methods, thereby incentivizing continued engagement in these essential sectors. The support encompasses three main categories: animal products, plant products, and general agricultural products, with allocation varying by member state. As a baseline requirement, 12-13% of direct payments must be allocated to CIS subsidies (European Commission, 2023).

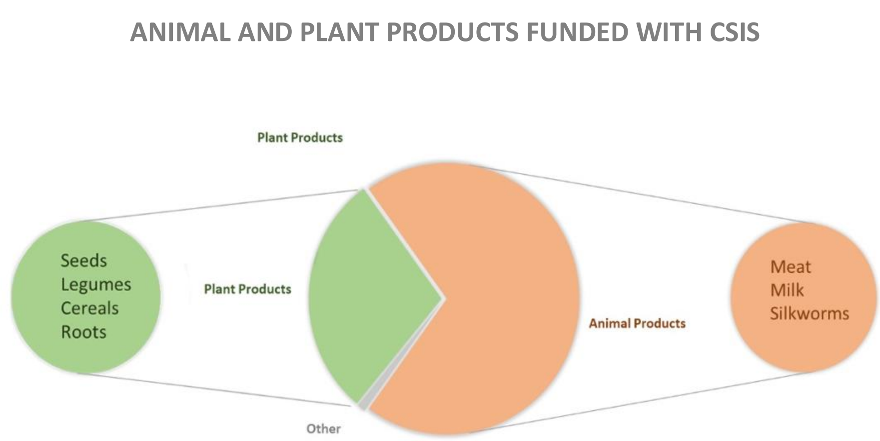

Figure 4: Animal and plant products funded with CSIS

Animal production commands the largest share at 70% of CIS funding, supporting key sectors including dairy production, sheep and goat farming, beef and veal production, and silkworm cultivation (European Commission, 2023).

The plant products sector receives substantial support for a diverse range of crops, including cereals, oilseeds, legumes and legume-grass mixtures, fiber crops (flax and hemp), rice, nuts, starch potatoes, seeds, olive products, hops, sugar beet, cane, chicory roots, and various fruits and vegetables (European Commission, 2023).

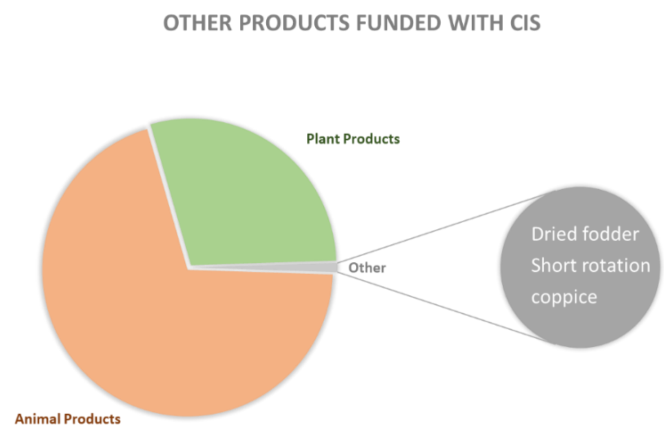

Figure 5: Other products funded with CIS

A smaller portion (1%) of CIS funding supports specialized agricultural products, notably dried fodder and short rotation coppice production (European Commission, 2023).

CIS payments predominantly focus on livestock and protein crops, with particular emphasis on the latter. Protein crops, specifically legumes and legume mixtures, receive 14% of allocations. This represents a significant increase from the previous CAP period's 11%, reflecting the EU's recognition of leguminous crops' environmental benefits. The 2023-2027 period demonstrates strengthened commitment through 20 dedicated CAP Strategic Plans targeting these crops (European Commission, 2023).

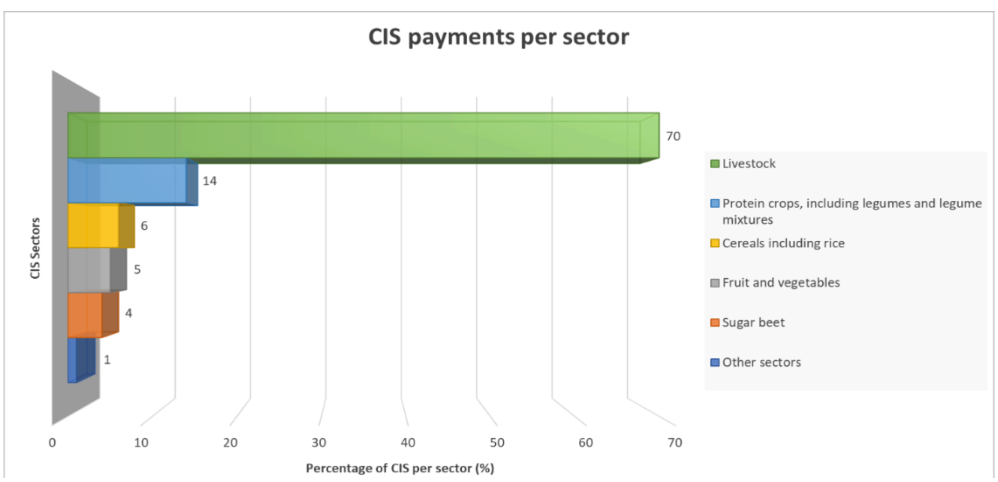

Figure 6: CIS payments by sector

2.3.2 Sectoral interventions

Beyond CIS payments, the new CAP framework strengthens agricultural sectors through enhanced producer partnerships and collaborations. This strategic approach enhances product value, strengthens farmers' market position, and improves overall market functionality through coordinated sectoral support and producer organization oversight (European Commission, 2023).

The European Agricultural Guarantee Fund (EAGF) supports approximately 900 producer organizations and groups, fostering collaborative rural development initiatives. These efforts are reinforced through comprehensive quality schemes, knowledge-sharing programs, and targeted training initiatives. The sectoral interventions focus on key agricultural domains with the following funding distribution:

- Fruit and vegetables sector (45%)
- Wine production (45%)
- Apiculture and national initiatives (7%)
- Olive oil and table olives (2%)
- Hops sector (0,12%)
- Other agricultural sectors (1%)

These core interventions are complemented by operational projects and sector-specific framework extensions, all contributing to environmental protection, climate change mitigation, biodiversity conservation, and sustainable agricultural practices (European Commission, 2023).

While legumes lack a dedicated intervention category within this framework, existing support mechanisms can accommodate legume cultivation, particularly when integrated with other supported sectors or aligned with pollinator-friendly agricultural practices.

2.3.3 Investment subsidies

Investment subsidies serve as a crucial EU instrument for advancing rural development through the second pillar of the CAP. These on-farm and off-farm investments drive agricultural digitalization, enhance competitiveness, and promote sustainability while protecting natural resources and biodiversity. The framework also strengthens local community development, addressing unemployment and fostering territorial growth (European Commission, 2023).

For the 2023-2027 CAP period, the EU Commission has allocated €10 billion to Horizon projects focused on farming, food, rural development, and bioeconomy initiatives, demonstrating its commitment to research, innovation, and knowledge sharing (European Commission, 2023).

The funding structure mandates that 30% of rural development expenditure must support climate change and environmental initiatives. This funding is accessible to farmers who transition to more environmentally sustainable cultivation practices (European Commission, 2023).

Additionally, 5% of rural development funding is earmarked for LEADER initiatives, which manage schemes generating positive socio-economic, environmental, and cultural impacts across European rural territories. This program encourages innovation adoption and cross-sector knowledge exchange, thereby strengthening overall rural development (European Commission, 2023).

Investment subsidies thus serve as a cornerstone of EU policy, particularly supporting smaller rural areas requiring additional assistance to achieve sustainability and economic viability.

2.3.4 Eco-schemes

Eco-schemes represent a key instrument of CAP 2023-2027, providing supplementary payments to farmers who implement EU-prescribed agroecological practices. These compensatory payments offset potential revenue losses from transitioning away from conventional farming methods, enabling farmers to adopt sustainable practices while maintaining financial stability (European Commission, 2023).

The EU has established 158 eco-schemes covering diverse environmental aspects, with the following distribution:

- Soil conservation (30%)
- Biodiversity and landscape feature preservation (20%)
- Grazing and grasslands management (15%)
- Organic farming and pesticide management (6%)
- Animal-related actions (5%)
- Peatlands and wetlands protection (2%)

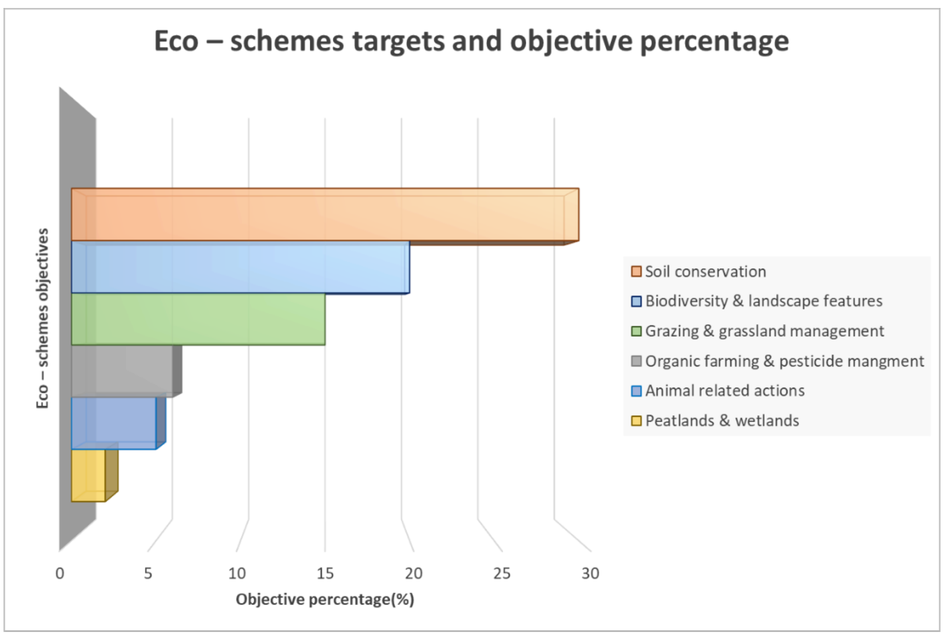

Figure 7: Eco-schemes targets and strand percentage

Integrated within these eco–schemes and agroecological practices are the targets of the Green Deal, which include:

- 50% reduction in chemical pesticide use
- 25% conversion to organic farmland
- 50% reduction in antimicrobials sales

- 50% reduction in nutrient losses through reduced fertilization

These eco-schemes, combined with advisory services and agro-environmental practices, support four key objectives (4,5,6,9) focused on climate change, environmental protection, biodiversity preservation, and welfare enhancement (European Commission, 2023).

Key Focus Areas of the Eco-schemes Framework

The EU's eco-schemes framework operates across six strategic domains, each targeting specific aspects of sustainable agriculture. From addressing climate change challenges to enhancing animal welfare, these interconnected focus areas form a comprehensive approach to agricultural sustainability. Each domain encompasses specific measures and targets designed to transform European farming practices while maintaining agricultural productivity.

Focus Area	Key Measures and Targets
Climate Change	✓ Climate mitigation and adaptation measures ✓ Greenhouse gas emission reduction ✓ Enhanced carbon sequestration
Water Quality	✓ Reduced pressure on water resources ✓ Water quality protection and improvement
Soil Health	✓ Soil fertility enhancement ✓ Improved nutrient sequestration ✓ Prevention of soil degradation
Biodiversity	✓ Natural habitat conservation ✓ Landscape feature maintenance ✓ Ecosystem preservation
Pesticide Management	✓ Reduced pesticide usage ✓ Sustainable cultivation methods
Animal Welfare	✓ Enhanced biotic standards ✓ Improved animal living conditions

Table 1: Strategic Domains and Measures under the EU Eco-schemes Framework (European Commission, 2023)

Agricultural Practices Under EU Support

Farmers can adopt various agricultural practices or combine multiple approaches within their operations. These practices fall into three main categories:

Category	Practices and Approaches
Organic Farming Practices	• Support for farmers transitioning to organic systems • Support for existing organic farmers maintaining their practices
Integrated Pest Management (IPM)	• Reduced pesticide usage • Mechanical weed control • Biodiversity protection measures • Land conservation without cultivation or chemical inputs • Introduction of pest-resistant crop varieties

	• Strategic use of biodiversity-enhancing fallow fields with biodiversity-promoting species
Specialized Agricultural Practices	
Ecological Management	• Agroecological use of leguminous crops • Cover crops between tree rows • Winter soil protection measures • Resilient crop varieties • Permanent grassland maintenance • Improved rice cultivation techniques

Animal and Land Management	• Animal welfare and husbandry programs
	• Agroforestry with landscape feature preservation
	• High-nature-value farming
	• Carbon farming:
	  ○ Peatland rewetting
	  ○ Winter water level control
	  ○ Permanent grassland maintenance

Technical and Resource Management	• Precision farming technologies • Advanced nutrient management • Water resource protection through demand optimization • Soil conservation through windbreaks and terracing • GHG reduction via improved animal nutrition and manure handling

Table 2: Categories of Agricultural Practices Supported by the EU *(European Commission, 2023)*

3. Penetration of ecosystem services

Legumes deliver substantial social and ecological benefits across agricultural systems, attracting growing attention throughout Europe. Their biological and agronomic properties play a vital role in advancing sustainability goals and facilitating protein transition in farming systems, leading to increased policy and research focus on their cultivation.

Despite these recognized benefits, legume production remained limited during 2015–2020, with grain legumes occupying less than 3% of EU arable land. This included primary crops such as faba bean, pea, and soybean. However, the introduction of CAP greening measures has sparked positive change, with France emerging as a pioneer in agricultural transition toward increased legume cultivation in 2019 (Van Loon et al., 2023).

The integration of legume cultivation with EU subsidies and eco-scheme frameworks demonstrates significant potential for expanding ecosystem services across European farms. This synergy between policy support and agricultural practice creates opportunities for broader adoption, though success depends on addressing both enabling factors and existing barriers to implementation.

3.1 Barriers to leguminous crops adoption

The adoption of leguminous crops faces multiple interconnected challenges across agricultural, environmental, economic, and social dimensions. These barriers significantly impact the expansion of legume cultivation despite their recognized benefits for sustainable agriculture. Key obstacles include yield limitations, climate change impacts, economic constraints, knowledge gaps, and market challenges.

3.1.1 Yield

Legume crop cultivation exhibits significant fluctuations primarily driven by EU subsidy patterns. A fundamental challenge lies in the inherently unstable and limited yield potential of legumes when compared to cereal crops. This yield gap largely results from the historical emphasis on cereal crop research and genetic improvement, which has produced more resilient cereal varieties capable of thriving under adverse conditions (Balázs et al., 2021).

Environmental conditions pose additional challenges to legume productivity. Drought and soil degradation significantly impact yield potential, while regional challenges in tropical and subtropical areas present unique obstacles. In these regions, high rainfall and elevated temperatures increase susceptibility to diseases. Furthermore, legumes' specific soil type requirements restrict their cultivation potential across different agricultural zones (Abobatta et al., 2021).

3.1.2 Climate change

Climate change presents escalating challenges for legume cultivation through its effects on soil quality and agricultural conditions. Rising temperatures trigger multiple degradation mechanisms that reduce both the quantity and quality of available agricultural land. Increased evaporation rates and disrupted precipitation patterns lead to more frequent drought conditions. These climate-driven changes create an urgent need for crop varieties capable of maintaining productivity under increasingly challenging environmental conditions (Abobatta et al., 2021).

3.1.3 Economic barriers

The economic viability of legume cultivation faces several critical challenges. Farmers encounter significant financial hurdles, particularly regarding the initial capital investment required for seeds and establishment of legume crops. These challenges are compounded by historically insufficient sector-specific subsidies (European Commission, 2023).

While recent policy developments have begun addressing these limitations through expanded strategic plans and enhanced financial support, economic barriers persist. The consistently higher yields and revenues associated with cereal crops continue to make legumes appear less economically attractive. This yield-revenue disparity significantly impacts market competitiveness and farmer adoption rates.

3.1.4 Knowledge gaps

An important barrier in legumes' adoption is the lack of knowledge about ecosystem services themselves, as well as the contribution of legumes in them (Ditzler et al., 2021). Farmers may not have access neither educational material nor expertise advice that could help them understand the value of legumes. This lack results in farmers not appreciating and understanding the benefits that legume crops could give in their businesses, preferring other kind of crops, mostly cereals (Balázs et al., 2021). On the other hand, consumers also don't know how legumes contribute to their dietary program through their nutritional and health value resulting in low market demand (Balázs et al., 2021).

Moreover, except for lack of knowledge, farmers may be prejudiced against the value of legumes. Under the prevailed unsure economic and market conditions, farmers will trust the procedures that they already apply and crops that they are already cultivated. The adoption of legumes for their ecosystem services is difficult to be done by them, without getting people to explain them the value of the particular crops and their positive impact in their farms.

To sum up, both sides affect the market interactions between suppliers and demanders for legume products, adding another barrier in the general integration of legumes.

3.1.5 Market barriers

Market-related challenges significantly impede legume adoption through various structural and systemic barriers. The agricultural sector's dominant focus on cereal-based systems has resulted in limited processing infrastructure and underdeveloped value chains for legume crops. Market transparency issues further complicate price discovery and fair value assessment (Sepngang et al., 2020).

Supply chain constraints pose additional challenges. Insufficient storage facilities and processing capacity create bottlenecks in the legume value chain. Poor coordination between producers and processors, coupled with a lack of established quality standards, creates uncertainty in market relationships and hinders efficient distribution (Van Loon et al., 2023).

Market development faces multiple obstacles, including limited market differentiation and inadequate price premium mechanisms. The absence of comprehensive labeling and certification systems, combined with low consumer awareness, restricts market growth potential. Policy frameworks often fail to adequately support market development, with fragmented support mechanisms and complex regulatory requirements further complicating market access (Murphy-Bokern et al., 2017).

3.1.6 Agronomic Constraints

Grain legumes, such as faba bean and pea, remain underrepresented in European crop rotations, occupying less than 3% of arable land, due in part to their limited compatibility with conventional rotation schemes dominated by cereals (Notz et al., 2023). Unlike cereals, which can be cultivated in close succession, legumes are biologically constrained by the recurrence of soil-borne diseases. To reduce the risk of severe yield losses caused by pathogens such as those in the *Ascochyta* complex, recommended cultivation intervals range from 6 to 10 years for pea and 5 to 7 years for faba bean (Böhm et al., 2021). These long breaks challenge the structure of existing crop plans and necessitate redesigning rotations rather than substituting cereals with legumes. Furthermore, expanding the area of grain legumes can increase the prevalence of host-specific insect pests. Regional build-up of *Cydia nigricana* (pea moth) is linked to pea density, while faba bean is a known host of *Aphis fabae* (black bean aphid) (Huusela-Veistola et al., 2006). Where other broadleaf crops such as oilseed rape or sugar beet are already included in the rotation, the addition of legumes may further complicate phytosanitary planning, due to the persistence of generalist pathogens like *Rhizoctonia* and *Sclerotinia* in the soil (Noack, 2016). These agronomic limitations underscore that including legumes in the crop plan is not a linear substitution but a systemic adjustment that must be accounted for in the design of CAP interventions supporting protein crop expansion.

3.2 Gateways of legumes crops' penetration

The integration of legumes into European agricultural systems requires an organized application of multiple strategies that address the various barriers to adoption. These gateways include advancing research and development (R&D), implementing effective environmental policies, increasing subsidies and financial support, enhancing farmer knowledge and training, expanding market development, utilizing digital technologies in agriculture, and promoting diversification and product differentiation. By focusing on these areas, the EU can create a more resilient agricultural system where legume crops play a vital role in sustainability, food security, and economic growth.

3.2.1 Research & Development (R&D)

EU is trying to support economically the research being done on leguminous crops, in order to conduct experiments and create more resilient legume crop species, which will be able to give high yields and of high-quality products (European Commission, Cordis). Experiments on existing crops and recognition of the benefits of leguminous crops can lead to valuable insights and quantifiable results. In the next stage, these results can be used in the economic aspect of farms with the most important indicator being the revenue. Having this information, more research can be conducted on combinations of crops to maximize the ecosystem services, minimize the negative impacts of cultivations and so rotating more and more in these kinds of crops.

The research and development will further help in food security challenges that world is facing (Abobatta et al., 2021). The role of legumes in food security could be crucial, given their high nutrient character. They provide a high-quality protein food, full of fiber and essential vitamins and minerals. Research also has shown that consumption of legumes and leguminous products helps prevent diseases like diabetes, cardiovascular diseases, obesity and cancer (Ditzler et al., 2021).

Legumes also form a source of protein for the part of the population that is vegan or vegetarian, something that is very essential for the food industry, as it can respond to this market group's needs for nutrients. The replacement of meat with legumes can lead also to more sustainable diets, by reducing the demand of livestock production and all the negative impact that this causes to the environment (Ditzler et al., 2021).

Taking all these into consideration, it is being understood that the possible creation of more resilient legume species could contribute importantly in food security challenges, as well as in development of sustainable agricultural systems.

There are plenty of sectors that R&D could contribute to making leguminous crops more efficient and remunerative. Firstly, R&D can support efforts to improve the genetic features of legumes. There is already some research on using genomic selection, as well as gene editing techniques for making leguminous crops more resilient, nutritious and of higher yield numbers (Biswas et al., 2023). In this genetic improvement, breeding programs contribute to combining traditional breeding techniques with modernized biotechnological practices, in order to make the cultivations more resilient against pests, diseases and climate change (Biswas et al., 2023). All these will result in making legume hybrids with better characteristics in genetical features, as in nutritional value.

Moreover, in this genomic improvement, experiments about nitrogen fixation are included. These experiments aim at enhancing the ability of legumes' symbiotic interaction with soil organisms. If that is achieved and symbiosis will be strengthened, then less synthetic fertilizers will be used in cultivations (Considine et al., 2017). As a result, soil health will be promoted and water quality will be improved, as there won't be chemical runoffs on the water table.

Last but not least, research is being conducted on how there will be an increase in pollinators attractions, through flower color, flower scent and nectar production (Considine et al., 2017). Moreover, research is being done on which types of pollinators are attracted by legumes and how it's possible to make an appropriate habitat for them to live. In this way, pollinators' population will be increased, and crops will take advantage of their actions (Porto et al., 2020). In all this, the use of pesticides and fertilizers must be taken into consideration, as they have a negative impact on pollinators' action, habitat and population.

All in all, R&D can fund research, actions and programs that promote agroecological practices in legume crops and simultaneously generating new methods in improving cultivation's features that will enhance the whole ecosystem in which crops are being cultivated. In the long run, this will result in promoting rural regional development and revenue increase in local businesses.

3.2.2 Environmental policy

As it is mentioned, climate change affects in a direct way the growth and yield of all crops, including especially legumes. The influence of climate change on water availability may also affect the legume cultivation. On the other hand, it is scientifically proved that legumes have an important positive impact on soil's quality, as they bring increased N levels from their coexistence with enzymes, which leads to lessening fertilizer use (Ditzler et al., 2021).

Evaluating the legume benefits in the environment and in crop cultivation, the EU is already making efforts in supporting legume crops, on a bigger scale. Through the years, the EU has been evolving in the sector of greening measures, by making rules and guidelines according to environmental needs in every region. Eco–schemes is a very important key tool, which is evolving and becoming more specific in every CAP period, promoting agroecological practices that include legumes.

These agroecological practices include crop rotation, intercropping, and cover cropping with legumes, which can improve soil structure and fertility, reduce pests and diseases, and enhance biodiversity (Everwand et al., 2017).

3.2.3 Subsidies

Linked to environmental policy, subsidies are the key to give farmers the incentive to adopt specific crop practices that promote ecosystem services. Eco–schemes that were described above, award the farmers that apply their practices in their farm businesses, including those for legumes.

The EU has already increased the percentage given in legume cultivation systems and aims at increasing the amount of money allocated in the near future or in the next CAP financial policies (European Commission, 2023). The targeted financial support in legume crop cultivation is the main key factor that will help overcoming the economic problem that farmers face in integrating these crops. This financial support may be direct payment for legumes or mixtures of legume production, subsidies for seeds, or increased payments for eco– schemes including legumes (Notz et al., 2023).

3.2.4 Knowledge and training

The EU should enhance the understanding of the diverse and complementary advantages of using legume crops for ecosystem services that they provide. That could be done through educational campaigns, workshops, field days, trainings and development of a material database and guidelines (European Commission, Cordis). Provided all these, farmers will be able to understand the value of legume crops both in the environment, through ecosystem services and in their fields through the benefits that legume provides.

Moreover, EU must take the knowledge transfer on by creating networks of farmers with same crop cultivation, aka legumes, which will help in exchange of experiences, innovations and knowledge about best practices and in general knowledge about legume crops. This networking can help provide support among farmers and encourage new farmers to adopt the legume crop cultivation in their businesses (EU CAP Network, 2021).

Lat but not least, farmers could become part of partnerships, in where apart from the support, they could benefit with lower prices of crop inputs like seeds or equipment for their fields.

3.2.5 Market Development

The development of markets for legume products is very important for legumes to be penetrated in measures of CAP. For this to be done, EU and countries must promote the benefits of legumes, as crops and as a key factor in ecosystem services provision. This knowledge will create demand from consumers which will bring the need for cultivation from farmers. As for the consumers, there should be related campaigns organized in order to raise more awareness and rotate consumer's preferences in less affecting food production systems, like livestock (Notz et al., 2022). Furthermore, the partnerships that were mentioned in knowledge transfer, could help in market development too. The network can be consisted of producers, retailers, companies, processors and stakeholders, creating new market opportunities, so legumes and legume products can be imported.

These partnerships could be with public or private organizations, at a national or international level. Public organizations could be governments or institutes and as for the private ones, companies that conduct research and experiments on crops and especially in legume programs. As for the national and international collaboration level, it helps in knowledge transfer as well as support in experiments or new farmers with legume crop cultivations.

3.2.6 Business digitalization

Digitalization could work partly supplementarily with R&D and training farmers. The funds that can be given from EU along with the training of farmers on legume cultivation, could lead to new technologies that can be used in fields for optimization of cultivation. These technologies could be drones for fields' control or even facilitation of cultivation practices implementation. Also, numerous platforms could be developed for input and output control or scanning of soil and crops in order to provide advices for improvement of practices being applied.

Lastly, through technology, revenues could possibly be estimated, with a deviation range, so farmers can know what to expect in order to configure their cultivation plans in a better and much more profitable way.

3.2.7 Diversification and product differentiation

Considering all of the above and combined to the great benefits of legume crop cultivation, farmers through some extra agroecological practices' appliance and some marketing strategies, could differentiate their product, by promoting the way of production, the conditions in fields, the biological way of production etc.

As for diversification, farmers could find environmentally friendly ways of producing legume crops, disengaging themselves from fertilizers or pesticides being sold in the market. In this way they will be able to manage more efficiently these product market fluctuations, as they won't affect their product directly. Also, the agroecological way of production would add value to the final products, bringing more revenues to the farmers.

Both diversification and differentiation include practices that cannot be referred to as conventional and may initially have a negative impact on farmers' income. That's why subsidies given from the EU could be essential in order to incentivize farmers to adopt such practices and adopt legume crops in their cultivation systems.

3.3 Farmers' perspectives on barriers and gateways in practice

Alongside the systemic barriers and enablers, insights from farmers across Europe provide valuable context on how these dynamics unfold in practice. Case studies presented in a recent report by the Institute for European Environmental Policy (IEEP, 2025) reflect the complex realities farmers face when adopting or considering protein crop diversification, particularly legumes.

In the Netherlands, a dairy farmer who integrated field beans and chickpeas into a mixed system noted that the transition was initially difficult due to pest pressure and lack of technical experience. Over time, collaboration with a knowledgeable partner and participation in CAP-supported eco-schemes helped improve outcomes. However, she emphasized that profitability remains constrained by the low cost of imported soy feed, which makes on-farm legume production less competitive. Support with seed access, subsidies, and market development were seen as essential to making legumes a viable part of the farm business model.

A German mixed arable-livestock farmer described protein diversification, including legumes, as part of a long-term strategy to strengthen resilience in the face of climate and market uncertainties. He stressed the importance of sustained investment in plant breeding, farmer education, and reliable supply chain commitments to support this transition. At the same time, he pointed to the limitations of comparing legumes with cereals under current conditions, as the most fertile land is often already allocated to cereal production, and weed control options for legumes remain limited. He noted that these comparisons frequently overlook the indirect benefits that legumes can provide, benefits that should be more fully recognized when shaping policy and support measures.

In Hungary, key challenges to legume adoption include unstable market demand, limited access to certified seed, and restrictive subsidy frameworks as reported by farmers. Although legumes are used to diversify crop rotations and enhance nitrogen in the soil, profitability remains uncertain due to the lack of stable buyers or reliable markets for these crops. Integrating legumes into public catering and procurement schemes has been identified as a potential mechanism to stimulate local demand and strengthen the seed market. However, the current subsidy design, particularly coupled support, fails to account for lower and more variable yields typical of organic systems, creating barriers to access. Agronomic constraints also persist, including the absence of approved herbicides for certain legume species and a lack of processing infrastructure. Without reliable buyers and post-harvest handling capacity, legume production remains high-risk despite its ecological value. Addressing these challenges may require coordinated action through farmer-researcher-industry consortia to ensure that market development, input availability, and knowledge exchange evolve in tandem.

In Austria, farmers involved in agroecological production have pointed out that the environmental benefits of legumes are often undervalued in current support frameworks. While practices such as no-till and cover cropping contribute to soil health and reduce fertilizer use, they are rarely acknowledged in economic assessments or adequately incentivized under existing schemes. There is a call for mechanisms such as carbon payments or eco-scheme bonuses to more accurately reflect the ecosystem services associated with these systems. Farmers have also stressed the importance of accelerating knowledge exchange through publicly supported on-farm trials and data-sharing initiatives, which could improve yields and reduce uncertainty in diversified systems. It has further been noted that transition costs linked to legumes are sometimes overestimated, while long-term input savings and environmental gains tend to be overlooked in standard evaluations.

These perspectives underscore the importance of aligning policy frameworks with the realities of farming systems. Building profitable and resilient business models for legumes will require action across the value chain, including better access to inputs, markets, knowledge, and appropriately designed support instruments. These findings reinforce the gateways identified earlier and highlight the value of grounding policy interventions in practical experience.

4. Conclusion

Leguminous crops are vital components of sustainable farming systems, offering a wide range of ecosystem services that enhance soil health, improve water management, support pollination, and contribute to carbon sequestration, among other benefits. Recognizing their ecological and agricultural value, the European Union has prioritized legume adoption within the Common Agricultural Policy (CAP). By increasing subsidies and integrating agroecological practices, the EU aims to provide farmers with both the financial means and practical incentives to incorporate legumes into their agricultural systems. This initiative seeks to ensure that, in the long term, the ecosystem services provided by these crops are realized and utilized across all EU member states to foster more sustainable food systems.

Despite their numerous advantages, significant barriers hinder the widespread adoption of leguminous crops. Challenges include economic constraints, underdeveloped markets, climate-related vulnerabilities, and a lack of awareness or knowledge among farmers regarding legume-specific benefits. Addressing these barriers requires a multifaceted approach rooted in solutions that are economic, environmental, market-driven, and knowledge-focused. Proposals to overcome these challenges include financial incentives through subsidies, investment in market development, research to enhance climate resilience, and training initiatives to transfer knowledge and innovative practices to farmers.

The CAP framework offers an effective platform to integrate these solutions, ensuring a coordinated approach to overcoming adoption challenges. By leveraging financial tools, environmental policies, and farmer-focused knowledge networks, the CAP can create a favourable environment for legume adoption. Simultaneously, research, market integration, and targeted support systems will align farming practices with ecological and economic sustainability goals. Through these measures, the EU demonstrates its commitment to integrating leguminous crops into farming systems, strengthening the agricultural sector, and addressing broader global challenges such as climate change, food security, and biodiversity loss.

5. National elaborations

Valereco has nine Living Labs taking place in the countries: Italy, Greece, the Netherlands, Spain, Portugal and Serbia. In this chapter, further details on each country specifically regarding the CAP follow.

5.1 Italy

5.1.1 Legume Strategy under CAP 2023-2027

The Italian Common Agricultural Policy (CAP) Plan focuses on enhancing the competitiveness and sustainability of the country's diverse agriculture and rural areas, by addressing various needs from different territories, including securing adequate income for farmers, protecting them from adverse climatic events, reducing the environmental impact of agriculture, combating labour exploitation, and improving the quality of life in rural areas. While the former regional Rural Development Programmes have merged into a single national CAP Strategic Plan, the Regions will continue to play a key role in implementing rural development interventions.

In the CAP Strategic Plan 2023-2027, Italy identifies legumes as strategic crops, to fulfil the new CAP goals, which include mitigating and adapting to climate change and achieving environmental targets related to air quality protection, natural resource conservation, and soil preservation. Italy integrated various strategies to support legumes spread and enhance their agronomic and economic role.

One of the main strategies adopted is an indirect support through eco-schemes that promote sustainable agricultural practices focusing on extensive forage systems and crop residue management for carbon sequestration, supporting practices that limit input use beyond GAEC 7 commitments.

In Pillar 1, the Eco-scheme 4, or CO-4 eco-scheme ('Extensive Forage Systems with Rotation' with a fund of €163 million) promotes a two-year rotation of leguminous, forage and renewal crops, with the aim of increasing the organic matter content of soils, promoting carbon conservation and adaptation to climate change. Within this scheme, there is a limitation on the use of herbicides and pesticides, to reduce the risks of environmental pollution and promote sustainable agricultural practices.

In addition to the eco-schemes, there is specific coupled support for protein and leguminous crops, with particular attention to the enhancement of productions intended for both animal and human nutrition. In fact, the plan recognizes the nutritional value of legumes for human consumption, promoting typical varieties of certified quality such as Protected Designation of Origin (PDO), and Protected Geographical Indication (PGI), also to strengthen the link with tradition and Made in Italy. In this coupled support for protein crops Italy allocates an extra 2% of its direct payments to the financial support per hectare of protein crops.

Furthermore, legumes are considered a strategic crop in the 2023-2027 Rural Development Plans (RDPs), as they contribute to crop diversification, environmental sustainability and food security. The RDPs, funded by the European Agricultural Fund for Rural Development (EAFRD), include measures to promote legume production, both through direct support to farms and through broader rural development actions.

These strategies are integrated with the broader objectives of the CAP of environmental protection, food security, the fight against climate change, the protection of natural resources and the defence of farmers' incomes, enhancing the multifunctionality of leguminous crops in the national agricultural fabric.

To conclude, Italy's strategy for the protein sector focuses on income support and enhancing competitiveness, while also contributing to climate change mitigation and improving the environmental sustainability of agricultural production systems. The agronomic characteristics of legumes, such as hardiness and nitrogen fixation capacity, make these crops significant for improving climatic and environmental performance and meeting the environmental sustainability requirements mandated by the CAP. Under GAEC7, farmers must diversify crops and have three or more different crops on plots of more than 10 ha. In these situations, including legumes in the crop rotation supports farmers to meet these obligations while enhancing soil fertility and reducing synthetic N fertilizer use.

5.1.2 Legume crops and acreage in Italy

According to EUROSTAT, the total cultivated area of legumes and forage crops in Italy remained somewhat stable, ranging from 1.259.920 to 1.401.550 ha. This results from differing trends in the two primary groups of legume crops.

Legumes, including beans, lentils, faba beans, and peas, are esteemed for their nutritional value as they supply nearly all essential amino acids required by humans. Promoting certified quality varieties (PDO, PGI) also serves to reinforce the connection with tradition and the "Made in Italy" brand.

The cultivation of dry grain legumes has exhibited a cyclical trend. It increased until 2014, when it reached the highest level (1.432.600 ha), followed by a decrease in 2015, then sharply declined in 2015 to 1.002.200 ha and 2016. It rose between 2017 and 2019, and progressively decreased till 2023, and finally slightly increased again by 5% (+4.140 ha) in 2024.

However, its quantity remained limited compared to protein crops grown for animal feed. Italy is a leading European producer of legumes whose most production supports the livestock sector, especially soybean and fodder legumes (peas, faba beans, lupins), with lucerne being the main legume harvested as a whole plant. The area cultivated with green legume crops exhibited a progressive increase of approximately 14% from 2016 to 2023. However, in 2024, we observed a decline of 1.7%, which corresponds to a reduction of 22.440 ha. Lucerne, the main legume crop in Italy, saw an increase of 39.620 ha cultivated in 2019 compared to 2016. However, it has exhibited a steady decline of 6% over the past five years. Field peas and broad beans saw early growth, peaking in 2019 and 2020, then stabilizing at around 14.320 and 53.350 ha, respectively, like the 2024 levels.

Notably, sweet lupin cultivation progressively increased and was 7-fold higher in 2024 than in 2016. This change was largely due to the CAP policies and incentives for farmers: new European measures have supported nitrogen-fixing crops such as legumes, including lupins, with greening aid (EFA) and coupled payments. Additionally, significant progress in breeding has produced varieties that are more productive and have higher resistance to anthracnose, allowing lupins to replace or supplement soybean in animal feed.

Crop(s) and land use in hectares (x 1000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2023%
Utilised agricultural area (UAA)								13.078,50		100,00%
Field peas	14,11	17,05	17,92	22,93	20,77	17,77	16,03	15,05	14,32	0,12%
Broad and field beans	56,06	57,14	56,83	65,59	67,52	62,47	53,55	49,76	53,35	0,38%
Sweet lupins	0,09	0,32	0,44	0,45	0,57	0,65	0,71	0,72	1,01	0,01%
Other dry pulses and protein crops n.e.c. (lentils, chickpeas, vetches, etc.)	17,16	25,01	31,44	26,86	24,19	23,33	18,99	19,48	20,47	0,15%
Lucerne	681,42	684,98	697,83	721,04	716,92	695,34	685,25	677,34	675,22	5,18%
Other leguminous plants harvested green n.e.c. (clover etc.)	448,54	501,45	510,02	511,03	524,60	531,95	602,18	618,60	598,74	4,73%
Fresh peas	16,26	15,23	15,56	16,20	16,15	15,73	16,43	15,17	15,13	0,12%
Fresh beans	18,69	18,62	18,37	18,25	17,92	18,38	15,75	16,71	16,84	0,13%
Other fresh pulses n.e.c.	7,59	7,55	7,99	7,62	7,37	7,35	7,21	7,02	6,47	0,05%
Total leguminous crops	1.259,92	1.327,35	1.356,40	1.389,97	1.396,01	1.372,97	1.416,10	1.419,85	1.401,55	10,86%

Table 3: Area of cultivation (x 1000 ha) in Italy (Eurostat [apro_cpsh1__custom_16662000]

5.1.3 Outlook for coming years

Climate change and food security are increasingly problematic for the EU and for Italy as well. Moreover, the Mediterranean climate amplifies soil organic matter oxidation levels causing GHG emissions and reducing soil fertility. The need to diversify crop rotations, with the side aim to increase soil organic matter accumulation and reduce the reliance on fertilisers, is therefore urgent and legume crops can play a crucial role in reaching these objectives. Farmers have multiple options. They can include grain legumes, with a relatively high market value, include more fodder crops such as Lucerne or clover leys, to support the local fodder production or use leguminous cover crops or relay-intercropped leys. The advantage of the grain legumes is that they provide high value and in pilot studies in the Apulia region was shown that subsequent cereal production was higher following grain legumes such as chickpea, faba bean, lentil and pea. Pulses are gaining attention as animal protein substitutes for veggie meat products, and there is a growing market for bakery, pasta and brewery products where at least part of the cereal ingredients are replaced with pulses. Finally, the standard market for pulses in Italy entails also the use of local and traditional varieties, 63 of which are included in Regional Germplasm Banks (Table 4).

Species	Nr. Conservation Genotypes	Region
Phaseolus coccineus L.	5	Toscana
Phaseolus vulgaris L.	42	Toscana (36), Umbria (5), Piemonte (1)
Cicer arietinum L.	6	Toscana (4), Puglia (2)
Lens culinaris L.	1	Puglia

Pisum sativum L.	4	Toscana (1), Puglia (1), Umbria (1), Piemonte (1)
Lupinus albus L.	2	Toscana (1), Puglia (1)
Vigna unguiculata L.	3	Toscana (2), Umbria (1)
Total	**63**	

Table 4: Conservation varieties of pulses in Italy in 2024

The advantages of fodder crops are that they need few agrochemical inputs, and therefore contribute to reaching the F2F objectives, while increasing soil organic matter content and soil fertility. They can further sustain national value chains such as Parmigiano-Reggiano cheese production. Cover crops sown in autumn or late winter allow to develop a high biomass that can be uses as green manure or dead mulch to suppress weeds and increase soil fertility before the sowing of a summer crop. Relay intercrops instead can be applied in regions with some summer rainfall, allowing to establish a legume sward after harvesting a summer crop. This allows to suppress weeds while increasing soil fertility.

The success of these multiple options depends on three main factors. **First**, we need to create stable and interesting market opportunities for the various products, to provide local value chains for grain legumes_that are easy to use for human consumption. The food processing industry can play a key role in this development. The same can be applied to the production of pulses for livestock use. Indeed, the main challenges for the marketing of fodder are related to the high transport costs of voluminous hay bales. Therefore, production and consumption must be aligned locally. In the **second** place, continuous climate change may either jeopardize or shift the core area of cultivation of grain legumes and other legume crops. This means farmers in newly adapted areas need agronomical support to learn how to grow the new crops and changes in machinery may be required. In the **third** place, especially grain legumes may suffer from weak competitiveness and susceptibility to diseases (e.g. *Aphanomyces*, *Fusarium*, root rot) and pests (e.g. *Helicoverpa armigera*) that are hard to control. This may further reduce the already low production levels, making the crops little attractive for farmers. For example, legumes should never be grown more than once every 3-6 years on the same plot. This causes some limits to the extent with which legume crops can be grown. An additional barrier mentioned by farmers in the Living Lab is that there are very few approved plant protection products, such as herbicides, insecticides, and fungicides, available for use on legume crops—and many of these are actually intended for horticultural species rather than legumes. However, the grain legumes should be considered arable crops and could often be treated with active ingredients like the once used in cereals. Widening the list of available products for legumes would reduce cost for crop protection and decrease the risk of resistance development.

In conclusion, there is still room for increase legume uptake in Italy, but agronomical and technical support is needed to support farmers in choosing the best legume crops for their local situation and in providing adequate support to grow the crops in a sustainable way, also from an economical point of view. The CAP policies can greatly incentivise farmers to incorporate legumes in their cropping systems, but bureaucratic administration connected to eco-schemes are withholding this and therefore should be reduced.

5.1.4 Conclusions and Policy Recommendations

In Italy about 10% of the UAA is grown with legume crops. This is a relatively high percentage if we consider that crop rotations should not include legumes more than once every 3-6 years (maximum percentage of legumes can be between 16 and 33% of the UAA). For example, in a 6-year rotation there could be one grain legume and one forage legume to optimize legume use. However, the feasibility would depend on the susceptibility of the system to pest, weed and disease development.

For this reason, to bring the national legume uptake to the maximum level, it is of utmost importance to sustain research to develop the most pest-suppressive crop rotations for specific legume problems. To this end, research should focus on a) variety testing and development, b) crop rotation development supported also by crop modelling, c) IPM innovations based on preventive measures, early diagnostic tools and technological innovations with low environmental impact to provide direct control whenever necessary.

To facilitate farmers in growing legumes, technical and agronomical assistance should be provided and guaranteed at national level. There should be close links between research and these consultancies to guarantee early uptake of innovations in the entire national territory, and not only by farmers who are lucky enough to live near research centres and universities. Furthermore, there is an urgent need to provide scientific evidence that crop protection products used in cereals can be used in legumes as well. This would reduce costs for crop protection in legume crops and reduce risk of resistance development.

CAP policies should lower the barrier for uptake by bureaucratic simplification. Too often farmers get lost in complex rules and administrative burdensome paperwork, distracting them from choosing the best local solution and choosing the solution that requires less paperwork, but may be less successful.

Agrifood industry participation in value chain development is needed to align consumer requirements to production choices. The local context may provide limits and opportunities to the production systems. It would be useful to align producers and local food processors in terms of possibilities and needs for both sectors. Providing a stable market for farmers would lower the barrier for increased uptake of legumes in their cropping systems.

5.2 Greece

5.2.1 Legume Strategy under CAP 2023-2027

In Greece's Strategic Plan for the CAP 2023–2027, legumes and protein crops constitute a key component of the support strategy for sustainable agriculture, environmental protection, and food self-sufficiency. Within this framework, they represent a strategic focus of Greece’s CAP interventions and are supported through a wide range of measures under both Pillar I and Pillar II.

Forage legumes, such as lucerne and clover, not only serve livestock feeding but also contribute to improving the competitiveness of the livestock sector by reducing feed costs, lowering dependence on imported protein sources, and enhancing the economic and social sustainability of livestock farming in rural areas. In addition, these crops can support the production of locally identified livestock products with low or even zero carbon footprints. Regarding grain legumes, eligible Coupled Income Support (CIS) beneficiaries include farmers cultivating vetch, lupin, bitter vetch, chickling vetch, field beans, chickpeas for livestock feed, forage peas for livestock feed, and soybean. Both grain and forage legumes play a crucial role in meeting the increased nutritional needs of animals, especially during the autumn–winter period, when grazing resources are limited, and animals are typically kept indoors.

Furthermore, legume cultivation is indirectly supported through several eco-schemes that promote environmentally friendly and sustainable farming practices. These include eco-schemes like the use of resilient and adapted species and varieties, the extension of application of ecological focus area, the implementation of improved green cover practices while enhancing biodiversity, aid for producers for the implementation of environmentally friendly management practices using a digital application for management of inputs and monitoring of environmental parameters and finally, conservation of organic farming and livestock farming.

Additional support for legumes is provided under Pillar II (Rural Development), which complements Pillar I income supports and market measures by strengthening the social, environmental, and economic sustainability of rural areas. Relevant measures include the protection of wildlife within protected areas, the protection and conservation of genetic resources, the conversion to organic practices and methods, projects for the improvement of agricultural holdings contributing to competitiveness, digital and green investments in agricultural holdings and investment support to protect farms against natural disasters, adverse climatic events, and catastrophic incidents.

Moreover, horizontal interventions further strengthen research, innovation, and knowledge transfer, which also benefit legume farmers. These actions include the development of collaborations linking research with production through Operational Groups of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), training and education activities for farmers and foresters, the provision of advisory services for farmers and other stakeholders, and the establishment of new Producer Organizations and Interbranch Organizations in the agricultural sector.

Overall, the promotion of legumes within Greece's Strategic Plan contributes directly to key CAP objectives, including climate change mitigation and adaptation, the sustainable management of soil and natural resources, and biodiversity enhancement. These efforts are fully aligned with the broader ambitions of the European Green Deal and the Farm to Fork Strategy, positioning legumes as essential crops in the transition to a resilient, sustainable, and self-sufficient agricultural sector in Greece.

(Greece)

5.2.2 Legume crops and acreage in Greece

Between 2000 and 2024, the total cultivated area of legumes in Greece showed a strong upward trend. According to national data, the total area under leguminous crops increased from 43.280 hectares in 2000 to 138.140 hectares in 2024—an increase of over 219% over the 24-year period (Eurostat).

Crop(s) and land use in hectares (x 1000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2023%
Utilised agricultural area (UAA)								5.282,43		100,00%
Field peas	10,78	14,87	13,04	12,86	12,60	18,37	20,31	21,35	21,35	0,40%
Broad and field beans	5,00	5,64	5,58	3,67	2,48	4,04	3,96	1,37	1,37	0,03%
Sweet lupins	5,04	13,93	17,48	15,28	13,40	11,62	11,88	13,29	13,29	0,25%
Other dry pulses and protein crops n.e.c. (lentils, chickpeas, vetches, etc.)	67,24	92,67	98,12	97,08	102,24	98,97	99,64	84,87	85,33	1,61%
Lucerne	25,97	34,85	30,66	44,52	25,62	13,44	22,87	13,55	11,10	0,26%
Other leguminous plants harvested green n.e.c. (clover etc.)	-	-	-	-	-	-	-	-	-	0,00%
Fresh peas	1,88	1,57	1,37	1,33	1,34	1,74	0,96	0,87	1,35	0,02%
Fresh beans	6,01	5,57	4,97	4,06	3,94	4,43	3,12	2,62	3,98	0,05%
Other fresh pulses n.e.c.	0,43	0,38	0,41	0,39	0,37	0,55	0,64	0,52	0,37	0,01%
Total leguminous crops	122,35	169,48	171,63	179,19	161,99	153,16	163,38	138,44	138,14	2,62%

Table 5: Area of cultivation (x 1000 ha) in Greece (Eurostat [apro_cpsh1__custom_16662000]

Between 2016 and 2024, the evolution of legume cultivation in Greece reflects a differentiated trajectory across crop types, shaped by national CAP priorities and targeted support instruments.

A notable increase is observed in field peas, which expanded from 10.780 hectares in 2016 to 21.350 hectares in 2024. This upward trend aligns with the inclusion of forage peas in Greece's CIS scheme under Pillar I, which explicitly supports protein-rich crops for animal feed as part of a national strategy to reduce dependency on imported protein and strengthen the competitiveness of the livestock sector.

Sweet lupins also experienced strong early growth, rising from 5.040 hectares in 2016 to a peak of 17.480 hectares in 2018, before stabilizing at 13.290 hectares in 2024. Lupins are clearly identified in the Strategic Plan as eligible for coupled support under the category of protein-rich grain legumes, which helps explain their continued role in crop rotations and livestock feeding systems. In contrast, broad and field beans declined from 5.000 hectares in 2016 to just 1.370 hectares in 2024, while field beans are listed among the crops eligible for coupled support.

Lucerne, despite being described in the Greek CAP as the country's dominant legume crop—with a 19% increase in area between 2011 and 2018 and total production exceeding 1.4 million tonnes—shows a declining trend in Eurostat data during recent years.

Finally, the category of "other dry pulses and protein crops"—including lentils, chickpeas, vetch, and other legumes for human consumption—remains by far the most prominent. These crops play a dual role: promoting food self-sufficiency and contributing to agro-biodiversity, thus holding a central position in Greece's protein crop strategy.

In summary, the Greek CAP provides a clear policy foundation for the expansion of field peas, sweet lupins, and dry pulses. While not all crop-specific trends are directly explained in the Strategic Plan, the broader trajectory reflects a targeted shift toward protein crop diversification, environmental performance, and economic resilience in livestock-oriented farming systems.

5.2.3 Outlook for coming years

Greece is expected to continue promoting legume cultivation, supported by favourable policy frameworks and agronomic opportunities. The momentum gained in recent years—particularly through targeted coupled income support for protein crops—is likely to carry forward under the current CAP Strategic Plan (2023–2027). Field peas, sweet lupins, and traditional dry pulses (like lentils and chickpeas) remain central in both feed and food systems, aligning with national efforts to enhance protein self-sufficiency and reduce reliance on imported soy.

In animal production systems, the increased integration of domestically grown protein crops is part of a broader strategy to improve feed security and reduce exposure to global market volatility. Forage legumes such as lucerne are also anticipated to maintain their relevance, especially in regions vulnerable to drought and soil depletion, due to their deep-rooted systems and soil-enriching properties.

Greece’s CAP interventions also place a strong emphasis on environmental sustainability. Legumes contribute to several environmental goals, including better nutrient management, improved soil structure, and biodiversity enhancement. Under eco-schemes, the CAP supports practices that capitalize on these traits, which helps farmers transition to climate-resilient systems. Commitments such as reducing synthetic nitrogen inputs and promoting crop diversity provide additional incentives for farmers to retain or adopt legumes in their rotations.

Nonetheless, future expansion faces several constraints. Limited processing and market infrastructure for food-grade pulses can hinder profitability, especially for smaller-scale producers. Climatic instability, including increasingly frequent droughts or extreme temperatures, can also affect yield consistency—particularly for rainfed systems in central and southern Greece. Additionally, although policy support is currently strong, farmers may hesitate to invest further if post-2027 funding is unclear.

Addressing these challenges will require continued efforts in innovation, knowledge dissemination, and risk reduction. The Agricultural Knowledge and Innovation Systems (AKIS) framework, as embedded in the Greek Strategic Plan, will play a key role in providing farmers with tailored technical guidance. Demonstration farms, digital tools, and local advisory services are expected to support best practices in legume management, pest control, and integration into diversified systems.

In short, the prospects for legume crops in Greece are promising but conditional: success will depend on sustained policy backing, functional markets, farmer capacity building, and a climate-responsive approach to farming. These elements together can support legumes in contributing to national goals of food security, environmental stewardship, and rural development.

5.2.4 Conclusions and Policy Recommendations

Over the past two decades, Greece has significantly increased its legume cultivation area, driven by strategic use of CAP tools and a clear policy focus on protein crop development. The integration of legumes into crop and livestock systems supports a multi-dimensional set of goals—ranging from feed autonomy and reduced nitrogen dependency to climate resilience and rural income diversification.

The national CAP Strategic Plan recognizes legumes as multifunctional crops, valuable for both economic and environmental performance. Coupled support and eco-scheme mechanisms have played a pivotal role in encouraging adoption, while rural development measures and AKIS structures provide the foundation for innovation and knowledge transfer.

To consolidate these gains and unlock the full potential of legumes in Greek agriculture, the following recommendations are proposed:

1. **Secure continuity of support beyond 2027:** Farmers need long-term certainty. Maintaining and refining coupled income support and eco-scheme eligibility for legumes will ensure sustained engagement and crop planning stability.

2. Strengthen value chains and processing infrastructure: Investments should focus on expanding domestic feed mills and pulse processing capacity—especially in regions like Thessaly and Western Macedonia. These actions would improve market access, reduce post-harvest losses, and enhance the profitability of legume crops.

3. **Foster local innovation and varietal adaptation:** Breeding and selecting legume varieties suited to Greek soils and climate conditions—particularly in arid or marginal zones—should be a national research priority. Participatory trials and farmer-led innovation projects should be expanded through EIP-AGRI and national AKIS hubs.

4. **Expand access to tailored advisory services:** Effective knowledge transfer remains essential. Enhancing region-specific advisory services, training programs, and demonstration sites will help close existing knowledge gaps in legume agronomy, especially for new entrants and mixed farming systems.

5. **Embed legumes within environmental monitoring frameworks:** Ensure that increased legume cultivation delivers measurable ecosystem benefits—such as improved soil health, reduced chemical inputs, and increased biodiversity. This requires coordinated monitoring at regional and national levels, as outlined in CAP performance indicators.

6. **Stimulate demand through food policy integration:** Policies promoting legume consumption, such as procurement guidelines for schools and hospitals, public awareness campaigns, and culinary promotion, can support demand-led expansion and reduce volatility for producers of food-grade pulses.

In conclusion, the foundation for integrating legumes into Greece's sustainable agricultural transition is solid. By investing strategically in infrastructure, innovation, farmer knowledge, and downstream demand, the country can anchor legumes not only as a technical solution, but as a vital component of a diversified, resilient, and forward-looking food system.

5.3 The Netherlands

5.3.1 Legume Strategy under CAP 2023-2027

The Dutch government has translated the EU's central CAP framework for 2023–2027 into targeted national measures through its National Strategic Plan (NSP). While the EU sets broad policy objectives—including increased sustainability, enhanced biodiversity, climate mitigation, and promoting a European protein transition—member states maintain flexibility in applying these objectives according to their own agricultural contexts and national priorities.

In the case of legumes, the Netherlands explicitly encourages their cultivation through voluntary eco-schemes, a key component of the new CAP designed to incentivize farmers toward more sustainable agricultural practices. Legumes are prioritized in the Dutch eco-schemes primarily due to their ability to naturally fix nitrogen from the atmosphere, thereby reducing reliance on artificial fertilizers, improving soil health, and supporting biodiversity through pollinator-friendly flowering periods.

The Dutch approach assigns a relatively high ecological value to nitrogen-fixing crops such as beans, peas, and lucerne. Farmers participating in these eco-schemes accrue points based on specific sustainability measures, with legumes scoring particularly well due to their multifunctional environmental benefits. These points directly translate into higher subsidy rates, motivating farmers to integrate legumes into crop rotations despite traditionally lower market profitability compared to intensive crops like potatoes or vegetables.

A key policy framework supporting this development is the Dutch National Strategic Plan (NSP) under the CAP 2023–2027. This plan translates EU-wide goals into specific national instruments. Within the NSP, voluntary eco-schemes play a central role in encouraging sustainable land use practices. Leguminous crops are given special attention in these schemes due to their agroecological benefits, such as nitrogen fixation, soil structure improvement, and their contribution to biodiversity. Farmers can earn higher scores within the eco-scheme point system by cultivating nitrogen-fixing crops, which increases their eligibility for financial support. This mechanism rewards legumes more generously than many other crop types. As a result, the NSP offers a direct economic incentive that aligns farm-level decision-making with broader environmental objectives. While the NSP does not prescribe mandatory cultivation targets for legumes—and the Dutch government has not set any formal quantitative goals for legume acreage— its structure strongly favors their integration into crop rotations, particularly on farms aiming to meet sustainability criteria and secure additional CAP payments.

Moreover, recognizing that long-term success depends on structural market demand rather than temporary subsidies, the Netherlands simultaneously invests in developing stronger market chains and fostering collaboration between farmers, processors, and retailers. Supportive measures under the second pillar of the CAP (rural development funding) include innovative pilot projects and initiatives aimed at creating stable demand for domestically produced protein-rich crops.

Crucially, the food sector plays an essential role in the potential success of legumes. Without active engagement and commitment from food processors, manufacturers, retailers, and food service providers, broad consumer acceptance and appreciation of legumes will be challenging to achieve. Initiatives within the food sector, such as product innovation, enhanced marketing strategies, consumer education campaigns, and transparent communication about the nutritional and environmental benefits of legumes, are pivotal. Collaborative efforts across the entire agri-food chain can significantly boost consumer preference and market uptake, reinforcing the sustainability and economic viability of legume cultivation.

Overall, the Dutch government's specific interpretation of the CAP aims not only to meet European sustainability objectives but also seeks to establish a durable, economically viable position for legumes within the national agricultural sector.

5.3.2 Legume crops and acreage in The Netherlands

Between 2000 and 2020, the total cultivated area of legumes and associated forage crops in the Netherlands remained relatively stable, fluctuating between 17,000 and 19,000 hectares. However, a clear structural shift has taken place in recent years. According to Eurostat data, the total area under leguminous crops grew from 19,650 hectares in 2022 to 27,384 hectares in 2024—an increase of nearly 40% in just two years (Table 6).

It is important to note that the Eurostat table presents land use in units of 1,000 hectares. As a result, smaller crops or niche leguminous species that fall below the threshold may not be visible in the dataset, even though they contribute to the sector's overall diversity and development.

Crop(s) and land use in hectares (x 1000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2023%
Utilised agricultural area (UAA)								1.803,00		100,00%
Field peas	-	-	-	-	-	-	-	-	1,13	0,00%
Broad and field beans	1,44	2,15	2,07	2,80	3,45	3,83	3,20	1,69	1,67	0,09%
Sweet lupins	-	-	-	-	-	-	-	-	-	0,00%
Other dry pulses and protein crops n.e.c. (lentils, chickpeas, vetches, etc.)	-	0,60	-	-	-	-	-	-	-	0,00%
Lucerne	-	-	7,56	7,62	7,51	7,32	6,60	11,10	12,29	0,62%
Other leguminous plants harvested green n.e.c. (clover etc.)	-	-	1,09	1,01	1,20	1,10	1,20	1,16	0,94	0,06%
Fresh peas	3,33	3,06	3,09	3,83	3,30	4,53	4,25	6,23	5,31	0,35%
Fresh beans	3,08	3,33	3,49	4,00	3,97	4,65	4,02	5,63	5,69	0,31%
Other fresh pulses n.e.c.	0,59	0,40	0,50	0,62	0,41	0,62	0,38	0,38	0,35	0,02%
Total leguminous crops	**8,44**	**9,54**	**17,80**	**19,88**	**19,84**	**22,05**	**19,65**	**26,19**	**27,38**	**1,45%**

Table 6: Area of cultivation (x 1000 ha) in The Netherlands (Eurostat [apro_cpsh1__custom_16662000]

The most remarkable increase during this period is seen in lucerne, which expanded from 6.110 hectares in 2022 to 12.291 hectares in 2024. This growth likely reflects the crop's ecological value, especially its nitrogen-fixing capacity, contribution to soil structure, and resilience to drought. In addition, the uptake aligns with CAP eco-schemes that reward the cultivation of perennial leguminous species.

Another notable development is in broad and field beans, whose combined area increased from 3.186 hectares in 2022 to 4.555 hectares in 2023, before falling back to 2.401 hectares in 2024. This temporary surge likely reflects a strong policy-driven uptake, followed by partial correction due to market saturation, practical cultivation challenges, or changing subsidy conditions. Despite this recent drop, the 2024 acreage is still substantially higher than historical baselines.

Fresh peas also exhibit steady growth, from 4.250 hectares in 2022 to 5.391 hectares in 2024. This trend may reflect rising consumer demand for locally grown, plant-based foods and the increasing number of retail and processing contracts. Similarly, fresh broad beans increased markedly from 1.045 hectares in 2022 to 1.601 hectares in 2024—more than a 50% rise—indicating a revival of interest in this traditional crop.

Smaller but consistent gains were made in sweet lupins, which rose from 300 hectares in 2022 to 360 hectares in 2024, and in dry broad beans, increasing from 148 to 337 hectares over the same period. Although these crops represent modest areas, they contribute to the growing diversity of protein-rich legumes in the Netherlands.

In summary, the years 2022 to 2024 mark a turning point for leguminous crops in the Netherlands. What was once a relatively static sector is now experiencing dynamic growth, particularly in lucerne, fresh peas, and broad beans. This development is driven by a combination of policy reform, CAP incentives, sustainability goals, and a renewed interest in multifunctional cropping systems and local protein production.

Participation of Dutch farmers in the CAP's eco-scheme has also increased since its launch in 2023, reflecting a broader commitment to sustainable agricultural practices. In the first year of implementation, approximately 70% of eligible farmers applied for support through the eco-scheme. Of those, a significant share qualified for the higher-tier levels: 45% reached the 'silver' level and 15% attained the 'gold' level, based on their chosen environmental practices and ecological contributions. Although the scheme is still in its early phase, these figures indicate a willingness among farmers to adapt to more sustainable crop management strategies. The cultivation of legumes—highly rewarded under the eco-scheme's point system—is likely to have contributed to farmers achieving these higher qualification levels. As the scheme matures and farmers gain experience with its criteria and administrative procedures, participation rates and the share of higher-tier applications are expected to increase further. What was once a relatively static sector is now experiencing dynamic growth, particularly in lucerne, fresh peas, and broad beans. This development is driven by a combination of policy reform, CAP incentives, sustainability goals, and a renewed interest in multifunctional cropping systems and local protein production.

5.3.3 Outlook for coming years

Looking ahead, the cultivation of legumes and forage crops in the Netherlands is expected to continue its upward trajectory, albeit at a more moderate pace than the rapid growth seen between 2022 and 2024. Several structural and policy-driven factors support this positive outlook.

The ongoing transition toward climate-smart agriculture and the implementation of sustainable protein strategies at both national and EU levels provide a solid foundation for continued interest in legumes. Crops such as field beans, lupins, and peas are likely to remain attractive due to their agronomic and environmental benefits—particularly their ability to fix nitrogen, enhance soil quality, and reduce reliance on synthetic inputs.

Lucerne is expected to retain a central role in more extensive and regenerative farming systems, especially in areas facing increasing drought pressure and soil degradation. Its perennial nature and compatibility with biodiversity goals make it a robust candidate for long-term integration into Dutch farming systems.

However, several challenges lie ahead. From 2025 onward, farmers are expected to face stricter eligibility requirements under the eco-schemes of the new Common Agricultural Policy (CAP 2023–2027). These changes may make it more difficult for certain farm types—particularly more intensive or specialized operations—to qualify for eco-payments based solely on current practices. This will probably impact the willingness or ability of some farmers to continue cultivating legumes if economic incentives become less accessible or more complex.

Additionally, the continued expansion of these crops will depend on the development of reliable processing infrastructure, improved value chain organisation, and targeted knowledge dissemination. Without these enabling conditions, recent gains risk plateauing or even reversing under changing policy frameworks or market uncertainties.

In conclusion, while the dramatic expansion observed between 2022 and 2024 is unlikely to continue at the same pace, the long-term outlook for legumes and forage crops in the Netherlands remains positive. With adequate policy alignment, market support, and technical guidance—particularly in the context of evolving eco-scheme criteria—these crops can continue to play a pivotal role in the transition to a more sustainable and resilient agricultural sector.

5.3.4 Conclusions and Policy Recommendations

The significant growth in the cultivation of legumes in the Netherlands between 2022 and 2024 reflects a clear response to national policy incentives, EU frameworks, and increased awareness of the environmental benefits of these crops. This development is closely aligned with Dutch ambitions for more sustainable, circular, and climate-resilient agricultural systems, as outlined in strategies such as the *Nationale Eiwitstrategie* and the broader implementation of the Common Agricultural Policy (CAP).

However, the continuation of this positive trend within the Dutch context is far from guaranteed. To secure the long-term position of legumes and forage crops in the Netherlands, policymakers are advised to focus on the following priorities:

1. Ensure continuity and clarity in Dutch implementation of eco-schemes under the CAP, especially considering the stricter requirements expected from 2025 onward. Transitional support or targeted guidance may be needed to maintain accessibility for diverse Dutch farm types.

2. Invest in Dutch infrastructure and value chain development for Dutch-grown protein crops, including processing capacity, logistics, and contracts with Dutch processors and retailers. This will reduce reliance on imports and strengthen national food autonomy.

3. Support research and innovation tailored to Dutch conditions, focusing on crop performance, disease resistance, integration into the farm's crop rotation plan and suitability for various soil types and climate zones across the Netherlands. Close cooperation between Dutch research institutions, breeders and farmers will be key.

4. Encourage knowledge exchange among Dutch farmers, with special attention to regions and sectors where legumes and lucerne are not yet common. Demonstration farms, region-specific crop guides and practical extension services can play a vital role here.

5. Monitor regional crop diversification within the Netherlands, ensuring that the increase in legume cultivation contributes meaningfully to national climate, biodiversity and soil health objectives.

In summary, the recent rise in legume area offers the Netherlands a unique opportunity to accelerate its agricultural transition goals. To fully seize this momentum, targeted, coherent, and Dutch-context-specific policy support will be essential.

5.4 Spain

5.4.1 Legume Strategy under CAP 2023-2027

The Common Agricultural Policy (CAP) 2023-2027, introduces a renewed focus on sustainability, biodiversity, and strengthening local production. The Spanish government has translated the central EU CAP framework for the period into specific national measures through the National Strategic Plan (PEPAC). Its architecture consists of a set of environmental requirements, obligatory and voluntary for the farmer, which should respond to the needs identified in the PEPAC and should contribute to the objectives of the Farm to Table and Biodiversity Strategy that are part of the European Green Pact.

This period is characterised by a result-oriented approach with a strong environmental focus, promoting crops such as pulses for their agronomic, economic and ecological value. The CAP Strategic Plan (PEPAC) 2023-2027 represents a great opportunity for generational renewal and for women with specific aids aimed at encouraging the incorporation of young people and women into the sector.

In this framework, legumes are priority crops because of their capacity to fix atmospheric nitrogen, which reduces the use of synthetic fertilizers, contributes to improving soil health, carbon sequestration and increasing biodiversity, key elements in the CAP strategy.

The inclusion of the legumes in the current CAP represents a step forward toward more sustainable and resilient farming practices. Acknowledging their multiple agronomic and environmental benefits, the 2023-2027 CAP promotes legume cultivation through eco-scheme incentives and specific coupled support payments.

Within the framework of the National Strategic Plan (PEPAC), these measures have a fundamental role to promote practices that are beneficial for the climate and the environment, in which legumes are given importance as a crop-improving species due to their multiple benefits. Some of these measures establish a minimum area for the cultivation of leguminous plants, encouraging their integration into crop rotations. Moreover, in this period the budget for coupled payments associated with protein crops increases with the aim of reducing Spain´s outer dependency on vegetable proteins.

The 2023-2027 CAP has as a cross-cutting objective of modernising agriculture and rural areas, by fostering and sharing of knowledge, innovation and digitalisation in agriculture and rural areas and by encouraging their uptake by farmers, through improved access to research, innovation, knowledge exchange and training.

The aim is to ease the sector’s response to challenges it may face, through an improvement of competitiveness and sustainability and by adapting itself to the citizens’ demands. It should be highlighted that the budget for advisory services and training will be reinforced during 2023-2027, which is an opportunity for the development of legume crops.

5.4.2 Legume crops and acreage in Spain

The area under leguminous crops in Spain has decreased over the decades, from more than one million hectares in 1961 to around 900.000 hectares in 2016. However, in recent years the trend has changed, according to Eurostat data, the total area under leguminous crops increased from 838.610 hectares in 2022 to 1.067.270 hectares in 2024, an increase of 27% in two years (see table 7).

Crop(s) and land use in hectares (x 1000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2023%
Utilised agricultural area (UAA)								24.867,31		100,00%
Field peas	155,41	173,85	149,02	145,40	116,99	115,33	122,51	229,23	195,99	0,92%
Broad and field beans	47,11	36,57	23,23	22,07	21,15	21,87	18,17	29,98	29,40	0,12%
Sweet lupins	3,58	3,61	2,98	2,45	2,39	2,76	2,70	4,25	2,98	0,02%
Other dry pulses and protein crops n.e.c. (lentils, chickpeas, vetches, etc.)	254,13	307,34	297,69	250,63	226,40	221,65	218,39	341,92	341,92	1,37%
Lucerne	270,87	266,03	260,34	259,29	255,89	243,88	227,21	218,62	227,83	0,88%
Other leguminous plants harvested green n.e.c. (clover etc.)	154,71	158,13	185,62	195,69	189,56	209,15	219,95	247,54	245,87	1,00%
Fresh peas	15,66	14,26	13,83	16,69	16,04	19,11	16,93	19,70	13,65	0,08%
Fresh beans	9,45	8,51	7,89	7,54	7,57	7,98	7,27	6,48	5,99	0,03%
Other fresh pulses n.e.c.	6,12	6,77	5,98	6,50	6,17	6,15	5,48	4,23	3,64	0,02%
Total leguminous crops	**917,04**	**975,07**	**946,58**	**906,26**	**842,16**	**847,88**	**838,61**	**1.101,95**	**1.067,27**	**4,43%**

Table 7: Area of cultivation (x 1000 ha) in Spain (Eurostat [apro_cpsh1__custom_16662000]

Of the legume crops, the most notable increase is observed in the group of dried legumes and protein crops (chickpeas, lentils, etc.), with an area of 218.390 hectares in 2022 to 341.920 hectares in 2024. This increase may be mainly due to the growing demand for animal feed, supported by agricultural policies that promote the sustainable cultivation of protein crops. Moreover, these crops are in line with eco-schemes that compensate for crop rotation with crop-improving species and the incentive associated with their cultivation that improves the economic margin per cultivated area.

Another leguminous crop that has increased its cultivated area is field peas, whose area increased from 122.510 hectares in 2022 to 195.990 hectares in 2024. It should be noted that, in 2023, the area sown to field peas was 229.230 hectares, this increase reflects the acceptance of the measures included in the CAP for the crop, and however, the slight reduction in the area sown the following year may be due to problems with the implementation of the crop or market saturation.

In the case of peas, fresh beans and other fresh pulses, the area under cultivation decreases slightly, e.g. in the case of fresh peas from 16.930 hectares in 2022 to 13.650 hectares in 2024. The decrease in the cultivated area of fresh legumes in Spain is due to several factors, including the difficulty in controlling weeds, lower profitability compared to other crops, and climatic instability affecting production. In addition, the difficulty in marketing the product also contributes to this decline.

The area under forage leguminous crops has increased from 219.950 hectares to 245.870 hectares. In the case of lucerne, the area devoted to its cultivation has remained constant in recent years. These crops are highly valued in extensive crop rotation due to their nitrogen-fixing capacity and their contribution to improving soil structure.

In summary, from 2022 onwards, a turning point has been marked in the area dedicated to sowing leguminous crops in Spain. This development has been driven by several factors; sustainability objectives, CAP measures and incentives, interest in lower input crops and domestic vegetable protein production.

5.4.3 Outlook for coming years

In the coming years, the cultivation of legumes and forage crops is expected to continue its upward trajectory, albeit more moderately than in the last two years, if there are no structural or legislative changes in the future.

The agronomic and environmental benefits of growing legumes in crop rotation contribute to the objectives of the European Green Deal and the Farm to Fork strategy, which aim to create healthier food systems and reduce inputs. In addition, the implementation of sustainable protein production strategies at EU and national level contributes to maintaining interest in the crop.

However, the growing of legume crops has several challenges both in terms of crop management and structural challenges that can slow down their development, such as yield instability, low weed competition, lack of seeds, lower economic margin than other crops, poorly developed value chains in some legumes, lack of market orientation. With proper alignment of policy strategies, farmer, market (agro-industry and consumer) and technical advice, the growing of legumes can continue to be a key part of resilient agronomic practices.

5.4.4 Conclusions and Policy Recommendations

The significant growth in the cultivation of legumes in the Spain between 2022 and 2024 reflects a clear response to national policy incentives, EU frameworks, and increased awareness of the environmental benefits of these crops. This development is closely aligned with Spanish ambitions for more sustainable, circular, and climate-resilient agricultural systems, as outlined in strategies such as the PEPAC and the broader implementation of the CAP.

However, the continuation of this positive trend in the Spanish context needs measures to help sustain it in the long term. To secure the long-term position of legumes and forage crops in the Spain, policymakers are advised to focus on the following priorities:

1. Ensure continuity and clarity in the application in Spain of schemes supporting the production and incorporation of legumes into sustainable farming systems within the CAP. Transitional or targeted support to maintain the accessibility of the various types of Spanish farms.

2. Invest in the development of the value chain for protein crops grown in Spain, including processing capacity, logistics and contracts with Spanish processors and retailers. This will reduce import dependency and strengthen national food autonomy.

3. Support research and innovation adapted to Spanish conditions, focusing on crop yields, disease resistance, integration into the farm's crop rotation plan and suitability for different soil types and climatic zones in Spain. Close cooperation between Spanish research institutions, breeders, the food sector and farmers will be key.

In summary, the recent rise in legume area offers Spain a unique opportunity to accelerate its agricultural transition goals. To fully seize this momentum, targeted, coherent, and Spanish-context-specific policy support will be essential.

5.5 Portugal

5.5.1 Legume Strategy under CAP 2023-2027

Under the CAP 2023–2027, Portugal's National Strategic Plan (NSP) aims to address climate adaptation, biodiversity conservation, and the strengthening of rural economies through crop diversification, with legumes recognized for their ecosystem services, particularly nitrogen fixation, reduction in synthetic fertilizer use, and support for agroecological transitions [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024]. The NSP includes specific support mechanisms where legumes play a role:

- Eco-schemes: Legumes qualify as nitrogen-fixing crops and contribute to compliance with crop diversification and environmental sustainability criteria [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024].

- Agri-environmental-climate measures: These promote sustainable practices, including the integration of legumes into crop rotations and as cover crops [*Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024].

- Protein Crop Plan ("Plano de Proteaginosas"): While not part of the CAP *per se*, this national initiative aligns with CAP goals by supporting domestic legume production and reducing protein import dependency [Portugal, National Energy and Climate Plan (NECP 2021–2030); *Portugal to Propose National Plant-Based Protein Strategy – Will the EU Follow?* 2025].

Despite these intentions, the strategy remains fragmented. Legumes are not yet systematically promoted as multifunctional crops, and farmers receive limited technical support for implementing legume-rich systems [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024].

5.5.2 Legume crops and acreage in Portugal

Legume cultivation in Portugal encompasses a variety of species, including dry pulses such as chickpeas, and lentils, and fresh legumes like green peas and green beans. According to recent Eurostat data (Table 8), the total area dedicated to leguminous crops in Portugal has shown a modest but clear upward trend in recent years, contradicting earlier perceptions of stagnation.

Crop(s) and land use in hectares (x 1000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2023%
Utilised agricultural area (UAA)								3.831,69		100,00%
Field peas	-	-	-	-	-	-	-	-	-	0,00%
Broad and field beans	3,21	3,55	4,19	3,13	3,60	4,67	6,88	8,93	11,15	0,23%
Sweet lupins	-	-	-	6,70	6,70	6,71	6,70	10,10	10,10	0,26%
Other dry pulses and protein crops n.e.c. (lentils, chickpeas, vetches, etc.)	15,67	15,51	16,28	8,17	8,67	9,03	9,75	10,49	9,91	0,27%
Lucerne	-	-	-	-	-	-	-	-	-	0,00%
Other leguminous plants harvested green n.e.c. (clover etc.)	-	-	-	-	-	-	-	-	-	0,00%
Fresh peas	0,72	1,56	1,67	1,55	2,34	2,50	1,94	1,54	2,26	0,04%
Fresh beans	0,51	0,69	0,74	0,72	0,62	0,83	1,03	0,57	1,01	0,01%
Other fresh pulses n.e.c.	0,45	0,62	0,66	0,58	0,68	0,67	0,85	0,40	0,95	0,01%
Total leguminous crops	20,56	21,93	23,54	20,85	22,61	24,41	27,15	32,03	35,38	0,84%

Table 8: Area of cultivation (x 1000 ha) in Portugal (Eurostat [apro_cpsh1__custom_16662000]

For instance, the combined area of broad beans and field beans has increased significantly, reflecting growing interest and adoption among farmers. In 2022, the acreage for broad and field beans was 6.880 ha, rising to 11.150 ha by 2024. This growth is partly driven by CAP incentives and national initiatives encouraging protein crop production. Fresh legumes, including green peas and green beans, have also experienced steady growth. Green peas, for example, increased from 1.940 ha in 2022 to 2.260 ha in 2024, supported by rising consumer demand for locally produced, plant-based foods and strengthened supply chains. Overall, the total area under leguminous crops in Portugal grew by more than 30% between 2022 and 2024, signaling a positive shift towards greater integration of legumes in Portuguese agriculture. This trend aligns with the objectives of the CAP 2023–2027 and the national Protein Crop Plan, which seek to enhance crop diversification, reduce synthetic fertilizer use, and promote agroecological transitions. However, challenges remain despite these encouraging developments. The legume sector in Portugal is still fragmented, with limited processing infrastructure and a lack of coordinated technical support for farmers adopting legume-rich systems. Addressing these barriers will be crucial to sustaining and accelerating the expansion of legume cultivation in the coming years.

5.5.3 Outlook for coming years

From 2025 onward, eligibility rules under eco-schemes may be adjusted to promote more sustainable systems, in which legumes could become key components in regenerative farming and mixed systems [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024]. Climate pressure and soil degradation also play a role, as legumes, especially perennial and deep-rooted types, can improve soil health and drought resilience, traits that are increasingly valuable in a warming Mediterranean climate [*Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024]. Additionally, if the Protein Crop Plan is effectively integrated into CAP mechanisms, there is potential for the expansion of domestic production, particularly of chickpeas, beans, and forage legumes [Portugal, National Energy and Climate Plan (NECP 2021–2030); *Portugal to Propose*

National Plant-Based Protein Strategy – Will the EU Follow? 2025]. However, barriers remain, including market fragmentation, lack of processing infrastructure, and limited farmer support and knowledge networks [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024; Portugal, National Energy and Climate Plan (NECP 2021–2030)].

5.5.4 Engaging the food sector to strengthen legume value chains and market readiness

While the CAP 2023–2027 and the national Protein Crop Plan promote legume cultivation through eco-schemes and agri-environmental incentives, the long-term success of these measures depends heavily on the active participation of the food sector. Without strong downstream demand, farmers may lack the economic motivation to transition towards legume-rich systems. Food processors, retailers, and food service institutions play a critical role in increasing the availability, visibility, and desirability of legume-based products. To ensure market readiness, it is essential to invest in processing infrastructure, foster product innovation, and support short supply chains that connect producers directly with local markets. Public procurement policies, particularly for schools, hospitals, and public canteens, should prioritize domestically produced legumes, creating stable demand and positive visibility. Additionally, culinary education and awareness-raising campaigns can help shift consumer preferences toward legume-based diets, which are aligned with sustainability and health goals. Without the strategic involvement of the food sector, the integration of legumes into Portuguese agriculture risks remaining fragmented and economically constrained, limiting their contribution to agroecological transitions and national protein self-sufficiency goals [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024; Portugal, National Energy and Climate Plan (NECP 2021–2030); *Portugal to Propose National Plant-Based Protein Strategy – Will the EU Follow?*, 2025].

5.5.5 Conclusions and policy recommendations

Portugal has a significant opportunity to strengthen the role of legumes within its agricultural systems through targeted CAP implementation. Recommended actions include:

• Enhancing support for legume-friendly eco-schemes under the NSP, ensuring accessibility and flexibility for small and mixed farms [*Portugal – CAP Strategic Plan*; *Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024].

• Strengthening the national legume strategy, aligning CAP measures with the Protein Crop Plan, and prioritizing legumes in public procurement and research funding [Portugal, National Energy and Climate Plan (NECP 2021–2030); *Portugal to Propose National Plant-Based Protein Strategy – Will the EU Follow?*, 2025].

• Promoting legume-specific extension services, demonstration farms, and knowledge-sharing platforms to overcome technical and cultural barriers [*Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024].

• Investing in value chains for pulses and forage legumes, particularly processing, storage, and short-chain marketing, to make legumes economically attractive [Portugal, National Energy and Climate Plan (NECP 2021–2030); *Portugal to Propose National Plant-Based Protein Strategy – Will the EU Follow?*, 2025].

• Engaging the food sector (e.g., processors, retailers, and public food services) to ensure market readiness and create stable demand for legume-based products. This includes fostering product innovation, supporting culinary education, and promoting the inclusion of domestically produced legumes in institutional procurement, such as school and hospital meals [*Portugal – CAP Strategic Plan*; Portugal, National Energy and Climate Plan (NECP 2021–2030); *Portugal to Propose National Plant-Based Protein Strategy – Will the EU Follow?*, 2025].

• Monitoring the agroecological impacts of legume integration to ensure that contributions to biodiversity, climate resilience, and soil regeneration are accurately captured and appropriately rewarded [*Green Architecture in the Portuguese CAP Strategic Plan (mainland): A Sustainable Path for Agriculture*, 2024].

5.6 Serbia

5.6.1 Legume Strategy under CAP 2023-2027

The Common Agricultural Policy is one of the most important sectors in the EU, both in terms of the number of regulations governing this area and the size of the agricultural budget in the overall budget of the European Union. EU agriculture accounts for almost 40% of the total EU budget. The main objective is to ensure a stable supply of the market for agricultural products at affordable prices, which in turn means adequate income for farmers.

When it comes to the Republic of Serbia, the agriculture sector is not focused only on harmonization of agricultural policy, that is Chapters 11 and 12 – Agriculture and rural development and Food safety, veterinary and phytosanitary policy. EU assistance is reflected in tangible donations, with the **Instrument for pre-accession assistance for rural development** (IPARD) serving as the prime example of that assistance. Out of the 13 measures offered by the European Commission to candidate countries for EU membership, the Republic of Serbia decided to implement seven measures within the IPARD III program:

- Investments in physical assets of agricultural holdings (Measure 1)
- Investments in physical assets concerning processing and marketing of agricultural and fishery products (Measure 3)
- Eco-oriented and organic farming (Measure 4)
- Implementation of local development strategies — LEADER approach (Measure 5)
- Investments in rural public infrastructure (Measure 6)
- Diversification of agricultural holdings and business development aims to increase the level of development of economic activities in rural areas, with the possibility of creating new jobs, which will directly increase the income of farms (Measure 7)
- Diversification of agricultural holdings (Measure 9)

The IPARD III Programme for the Republic of Serbia for the period 2021 - 2027 was adopted by Decision of the European Commission No. C(2022)1537 of 9 March 2022. Compared to the previous programming period, the financial contribution of the European Union for the IPARD III Programme is increased to EUR 288 m, which with the contribution of the Republic of Serbia and the private contribution of recipients, will provide over EUR 580 m of support to the agriculture and rural development sector.

5.6.2 Legume crops and acreage in Serbia

Conventional legumes production

Legume crops hold an important place in Serbian agriculture, both for human consumption and as valuable components of livestock feed. From 2016 to 2024, Serbia has shown varied trends in the cultivation of major legume crops, including soybeans, peas, beans, and forage legumes such as lucerne and clover. Soybean remains the most significant legume crop in Serbia in terms of cultivated area. The production area has steadily increased from 182.362 ha in 2016 to a peak of 237.036 ha in 2021, followed by a slight decline to 219.083 ha in 2024. This growth reflects increased demand for soybeans in both domestic markets and for export, especially in the livestock and food processing industries. The cultivation of peas has experienced a gradual decrease over the years, from 7.502 ha in 2016 to 5.216 ha in 2024. This decline may be attributed to changing dietary habits and lower profitability compared to other crops. Similarly, common bean production has dropped from 12.404 ha in 2016 to 6.243 ha in 2024, with a consistent downward trend. "Other legumes" which include minor crops like lentils or chickpeas, have been cultivated in much smaller areas, ranging from 903 to 1.801 ha in the available data. These crops appear to be of marginal importance in Serbia's overall agricultural output but still contribute to crop diversity and soil health through nitrogen fixation.

Forage legumes such as lucerne and clover are essential for livestock nutrition. Lucerne has maintained a stable and substantial presence, with cultivation varying around 106.000 ha for the last ten years. Clover, on the other hand, has shown a gradual decline from 73.281 ha in 2016 to 55.483 ha in 2024. The area under grass-legume mixtures also fluctuated significantly, peaking at 34,240 ha in 2019 before decreasing to 21.506 ha in 2024, indicating possible changes in livestock feeding strategies or land use.

Crop(s) and land use in hectares (x 1000)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2023%
Utilised agricultural area (UAA)								3.396,31		100,00%
Field peas	-	-	-	-	-	-	-	-	-	0,00%
Broad and field beans	12,40	13,20	9,11	9,09	8,51	8,05	8,63	7,04	6,24	0,21%
Sweet lupins	-	-	-	-	-	-	-	-	-	0,00%
Other dry pulses and protein crops n.e.c. (lentils, chickpeas, vetches, etc.)	1,20	1,40	1,50	1,80	1,68	1,44	1,28	0,96	0,90	0,03%
Lucerne	107,40	112,20	103,40	106,10	104,19	106,34	108,24	103,67	106,70	3,05%
Other leguminous plants harvested green n.e.c. (clover etc.)	73,30	70,50	63,70	61,73	60,24	57,05	55,35	53,12	55,50	1,56%
Fresh peas	7,50	8,10	6,70	6,30	6,00	5,79	5,54	5,31	5,22	0,16%
Fresh beans	-	-	-	-	-	-	-	-	-	0,00%
Other fresh pulses n.e.c.	-	-	-	-	-	-	-	-	-	0,00%
Total leguminous crops	201,80	205,40	184,41	185,02	180,62	178,67	179,04	170,10	174,56	5,01%

Table 9: Area of cultivation (x 1000 ha) in Serbia (Eurostat [apro_cpsh1__custom_16662000]

5.6.3 Outlook for coming years

Conventional legume production

Overall, legume crop sector in Serbia has seen dynamic shifts over the past decade. While soybean continues to dominate and expand its role, traditional food legumes like peas and beans are witnessing reductions. Forage legumes remain critical for the livestock sector, but trends suggest a re-evaluation of crop choices is ongoing. These patterns reflect local economic, dietary, and environmental influences.

Organic legume production

Legumes have a share of 15% in relation to the total certified areas in the Republic of Serbia. Considering their wide purpose in various industries, as well as the growing demand for organic products, it is assumed that the growth of areas in organic production by legumes could be expected.

5.6.4 Conclusions and Policy Recommendations

The increased recognition of legumes for their ecological and agronomic benefits presents Serbia with a valuable opportunity to enhance sustainable agriculture, reduce input dependency, and align with EU Green Deal objectives. Although Serbia's legume cultivation remains modest compared to some EU countries, recent policy interest and ongoing reforms in alignment with the EU accession process provide a strong foundation for further action.

To foster a systemic integration of legume system services in Serbian agriculture, the following policy priorities are recommended:

1. Strengthen National Incentives for Legume Cultivation Aligned with EU Green Architecture

- Develop pre-accession eco-schemes and agri-environmental measures that reward legume cultivation as a low-input, soil-enhancing practice.
- Provide transitional subsidies and technical support to encourage uptake, especially among smallholders and mixed crop-livestock systems.

2. Invest in Domestic Processing and Market Infrastructure for Serbian-grown Legumes

- Enhance public-private investment in legume cleaning, storage, and processing facilities to reduce post-harvest losses and increase added value.
- Support the creation of producer organizations and contract farming schemes with Serbian food processors and retailers to secure market access.

3. Expand Locally Relevant Research and Innovation on Legume Performance

3. Fund applied research in collaboration with Serbian agricultural universities and institutes (e.g., Institute of Field and Vegetable Crops in Novi Sad) on legume varieties suited to local conditions, pest resilience, cropping schemes, and intercropping strategies.

- Encourage on-farm trials and participatory breeding of legumes, especially for drought-prone regions of Vojvodina, Šumadija, and Eastern Serbia.

4. Enhance Farmer Capacity through Regional Knowledge Exchange and Extension Services

- Establish demonstration farms and model crop rotation systems that integrate legumes (e.g., soybean, chickpea, lentils, clover) in diverse Serbian agroecological zones.
- Train advisory services to provide practical, site-specific guidance on legume cultivation, especially targeting areas with low adoption.

5. Monitor Crop Diversification and Ecosystem Impacts at the Regional Level

- Integrate legume system services into Serbia's agricultural monitoring systems to track contributions to soil health, biodiversity, and reduced nitrogen input.
- Develop regional targets for legume coverage aligned with climate adaptation and carbon sequestration strategies under Serbia's National Agriculture and Rural Development Strategy (NARDS).

Conclusion

The integration of legume system services can support Serbia's transition to a more resilient, environmentally friendly agricultural sector while strengthening national food autonomy and preparing for EU membership. For this potential to be realized, coordinated national policy support, investment in infrastructure and knowledge, and strong alignment with both local needs and European frameworks will be essential.

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