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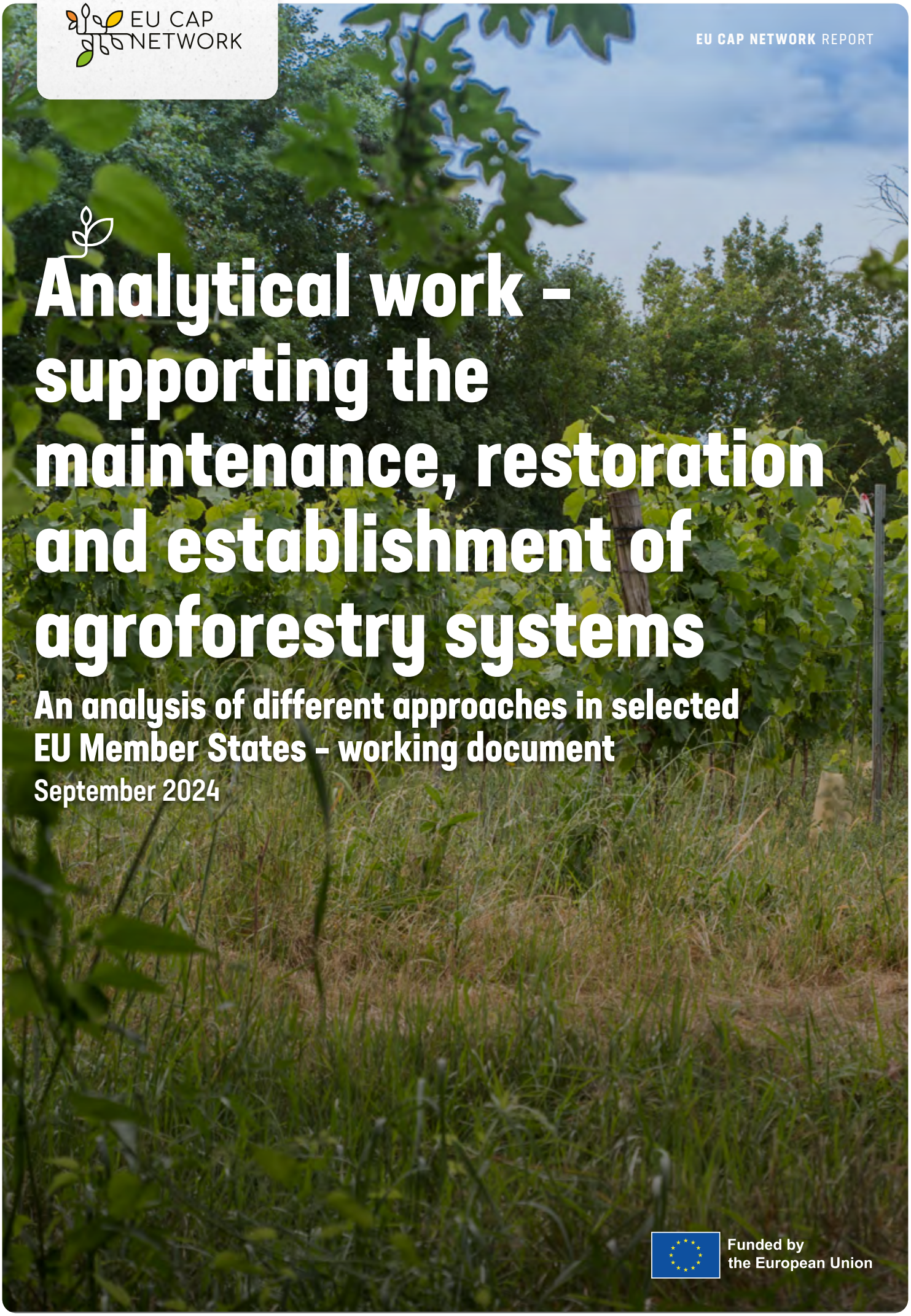

Analytical work – supporting the maintenance, restoration and establishment of agroforestry systems

An analysis of different approaches in selected EU Member States – working document

September 2024

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Disclaimer:

This working document describes the analysis of different approaches to agroforestry in six selected EU Member States (Belgium-Flanders, Czechia, Greece, France, Italy, Spain). The contents of this document are primarily based on information collected by the EU CAP Network's CAP Implementation Contact Point from representatives of Member State Managing Authorities during the period from November 2023 to April 2024, complemented by information from desk research and expert interviews with representatives of relevant national authorities carried out in early 2024. The contents of this document do not necessarily reflect the opinion or the position of the European Commission.

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1. Introduction to the report

This report provides an overview of the current state of agroforestry in six EU Member States (Belgium-Flanders, Czechia, France, Greece, Italy, Spain). It provides an overview of the current experience related to the maintenance, restoration or establishment of agroforestry systems in the selected Member States, and presents an overview of the successful approaches to agroforestry and barriers hindering its further restoration or establishment, as well as the tools used under the Common Agricultural Policy (CAP) Strategic Plans (CSP) to support agroforestry. The analysis complements earlier analytical work performed by the EU CAP Network (CAP Implementation Contact Point) on "Supporting the establishment and regeneration of agroforestry systems"[1], published in September 2023.

The work focuses on agroforestry and its contribution to sustainability, with a particular emphasis on its role in supporting climate change adaptation and mitigation, as well as enhancing biodiversity. This report primarily aims to improve awareness and understanding of the benefits of agroforestry and its importance for climate neutrality and resilience, as well as analysing biodiversity in the EU Member States.

1.1. Structure of the report

The report is structured into three main sections, which:

- provide an overview of the benefits of agroforestry in economic, social and environmental terms as identified in the literature;
- describe the current situation of agroforestry in the selected Member States, and look into key country-specific barriers and opportunities for the maintenance, restoration or establishment of agroforestry; and
- describe how CSPs and other national initiatives support the maintenance, restoration or establishment of agroforestry.

Annex 1 provides an overview of selected transnational projects and initiatives focused on agroforestry in Europe. Annex 2 lists websites, publications and key actors relevant to agroforestry in the six countries.

1.2. Methodology and sources of information

The report's findings are based on a literature review and qualitative data collection for the six Member States. Relevant national authorities[2] in the six Member States were invited to complete an online survey answering questions about the state of play on agroforestry and CAP support in their respective countries (November 2023 – January 2024). Semi-structured interviews were conducted as follow-up for clarification and further in-depth considerations from January to April 2024. This report is not a review of the CSPs themselves. Information collected from the interviews was supplemented by an interview with the European Agroforestry Federation (EURAF) and input gathered during the Agromix Agroforestry Policy Summit[3] held on 17 April 2024 in Brussels.

1.3. Key findings

Key findings of this work include:

- Key opportunities related to agroforestry include its potential for climate change mitigation and adaptation, soil health and above- and below-ground biodiversity, diversification of farm income and its contribution to improving resilience (see section 2).
- The main barriers to increasing the restoration, establishment and maintenance of agroforestry systems remain a lack of knowledge, economic constraints, and regulatory aspects (see section 3.2).
- Advisory services and cooperation are key for supporting agroforestry and raising awareness about its potential and benefits (see section 3.2).
- Capacity building for a range of stakeholders, including farmers but also staff working in Ministries responsible for the planning of agroforestry interventions, is crucial to ensure effective design and uptake (see section 3.2).
- While the situation in relation to agroforestry varies across Member States (see section 3.1), all Member States interviewed support agroforestry in one way or another via the CAP and additional national support mechanisms (see section 4).

[1] Available at: https://eu-cap-network.ec.europa.eu/publications/analytical-work-supporting-establishment-agroforestry-systems_en.

[2] Including CAP Strategic Plan Managing Authorities, Ministries and CREA (Council for Agricultural Research and Economics) in the case of Italy.

[3] See: https://agromixproject.eu/events/agromix-policy-summit/.

2. Benefits and risks of agroforestry

Agroforestry is defined in many different ways, but can be described as the practice of deliberately integrating perennial woody vegetation (trees or shrubs) with crop and/or animal production systems on the same plot of land. Box 1 gives an overview of possible common forms of agroforestry systems. Agroforestry covers approximately 8.8%[4] of the EU's utilised agricultural area (UAA). Most existing systems in the EU are silvo-pastoral agroforestry systems, which typically combine animal grazing, foraging, or fodder production with trees or other woody perennials on the pasture.

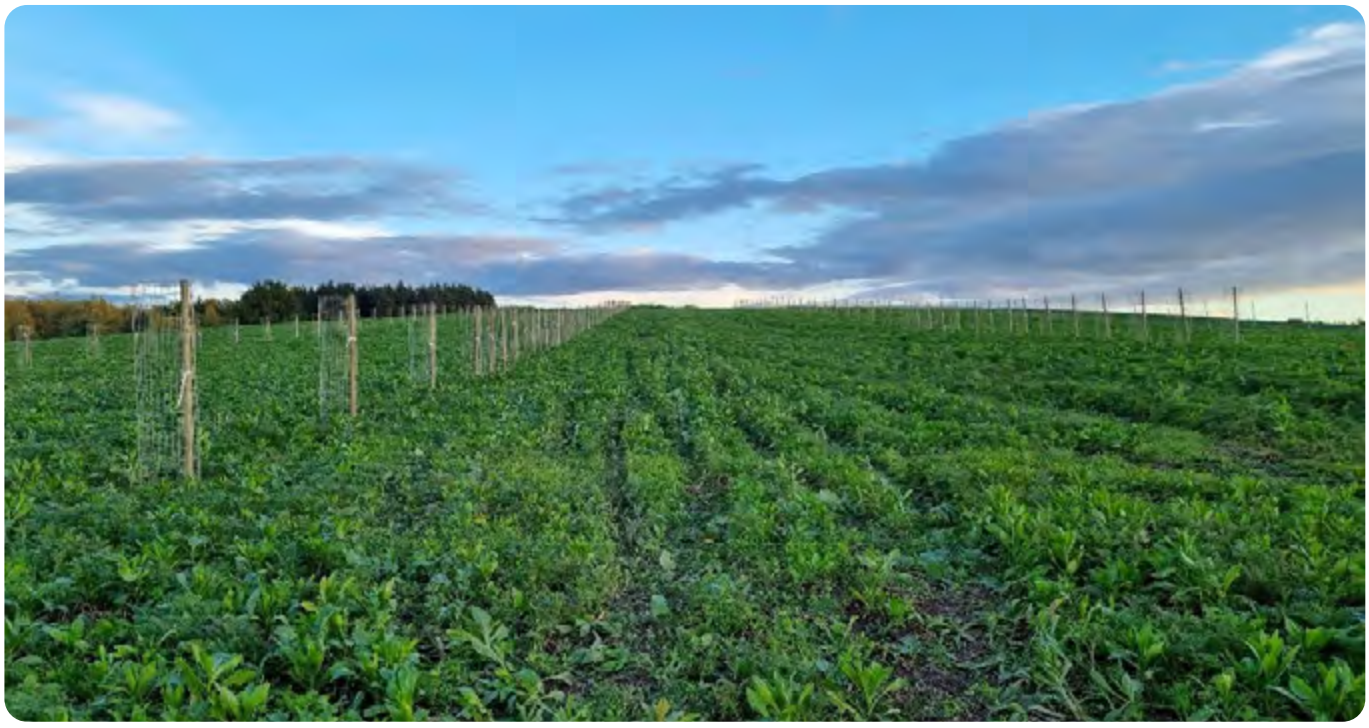
Box 1: Overview of common forms of agroforestry

Common forms of agroforestry

- **Silvo-pastoral:** combination of trees and shrubs with forage and animal production, e.g. wood pasture, orchard grazing.
- **Silvo-arable:** trees and shrubs intercropped with annual or perennial crops, e.g. alley cropping, orchard intercropping.
- **Forest farming:** a special form of silvo-arable, comprising forested areas used for production or harvest of natural-standing specialty crops often involving vertical crops, e.g. multi-storey cropping, non-timber forest products.
- **Home gardens:** a special form of silvo-arable, comprising a combination of trees/shrubs with vegetable production.
- **Agro-silvo-pastoral:** a mixture of silvo-arable and silvo-pastoral systems.
- **Linear agroforestry:** lines of natural or planted perennial vegetation (tree/shrub) bordering croplands/pastures, e.g. hedges, windbreaks, riparian buffer strips.

Source: EURAF and EP Briefing[5]

The implementation of agroforestry systems is a promising carbon farming action with several environmental benefits, including soil health, biodiversity, climate mitigation and adaptation (see section 2.1). Agroforestry may also deliver economic benefits, including through opportunities for farm income diversification, improving yield stability, or generating payments for carbon sequestration and other ecosystem services (see section 2.2).



Silvo-arable agroforestry system in Czechia, (Tereza Humešova)

[4] Herder, M, Moreno, G, Mosquera-Losada, M R, Palma, J, Sidiropoulou, A, Santiago-Freijanes, J, Crous-Duran, J, Paulo, J, Tomé, M, Pantera, A, Papanastasis, V, Mantzanas, K, Pachana, P, Papadopoulos, A, Plieninger, T and Burgess, P (2017) Current extent and stratification of agroforestry in the European Union. Agriculture, Ecosystems & Environment No 241, 121-132.

[5] See: Agroforestry in the European Union (europa.eu).

2.1. Environmental and climate aspects of agroforestry in the EU

The environmental co-benefits of agroforestry (outlined in more detail in sections 2.1.1 and 2.1.2) can be summarised as follows:

- **Climate mitigation potential:** 8-235 $MtCO_{2eq}$/year depending on type of agroforestry and area converted to agroforestry [6].
- **Climate adaptation:** provide shade to plants and improve water storage in soils. Can grow and produce food even during long-lasting droughts. Benefits on croplands and grasslands are similar.
- **Soil health:** improved soil health through prevention of erosion and reduction of nutrient leaching; increased disease and pest control.
- **Biodiversity above-ground:** improved biodiversity and micro-climate, especially for bird communities in silvo-pastoral systems.
- **Biodiversity below-ground:** increase in overall microbial diversity
- **Water balance:** improve water conservation, soil water storage, and reduce chemical pollution effects on water quality.

2.1.1. Supporting climate change adaptation and mitigation

Carbon sequestration

Agroforestry systems have the potential to sequester carbon, and yet their mitigation potential depends on the type of system implemented, the climate and the previous land use [7]. The Agforward project [8] has estimated the carbon storage potential of agroforestry in the EU27 (plus Switzerland) to be between a total of 7.7 – 234.8 Mt CO_{2eq}/year (not including below-ground soil organic carbon - SOC) [9], depending on type of agroforestry implemented and extent of farmland converted [10].

Silvo-pastures, alley cropping, home gardens and windbreaks are among the most common forms of agroforestry, and sequester more carbon than pastures or cropland [11]. This is due to higher biomass production compared to conventional agriculture, since carbon can be stored in plants and soils. Silvo-pastoral systems sequestered the highest amounts of aboveground carbon, whereas home gardens were best at sequestering carbon in soils per area unit. Younger trees (< 20 years) manage to increase carbon in soils more than old trees. Experiments of agroforestry fields, in Belgium, showed that trees increased organic carbon in the plough layer by 5.3 tonnes, compared to plots without trees [12].

Nevertheless, emissions occurring during tree planting due to soil disturbance must also be taken into consideration, as well as the variance in removals according to tree species and the risks associated with emissions if trees are harvested or removed. To assess the climate mitigation potential of silvo-pastoral agroforestry systems over long periods of time, emissions from livestock must be incorporated [13].

Releases of sequestered emissions from poor management and natural events should also be considered. Planting fast-growing trees in high density increases the mitigation potential of the system, but requires more management costs and increases the total shade. Agroforestry systems also need to be properly managed, otherwise there is a risk of short-term and long-term environmental issues [14].

Climate adaptation and nutrient management

Agroforestry systems can deliver biophysical benefits to help agriculture adapt to the impacts of climate change. Trees can provide shade to plants, animals, and humans, providing a cooler environment, serving as rain shelter, and buffering weather extremes such as heatwaves or storms. Through its cooling effect on the microclimate, agroforestry can reduce damage from droughts. Water use efficiency can be improved by reducing the amount of water lost through soil evaporation and transpiration [15] due to increased ground cover [16]. Agroforestry practices also improve water conservation, soil water storage, and reduce chemical pollution effects on water quality [17] due to reduced runoff. Since agroforestry systems use a large soil volume from which to draw water, they can grow and produce food even during long-lasting droughts. Trees can also reduce the risk of floods [18] through water use and storage, providing a barrier, slowing water flows and ensuring greater infiltration capacity [19].

[6] Kay, S, Rega, C, Moreno, G, den Herder, M, Palma, J H N, Borek, R, Crous-Duran, J, Freese, D, Giannitsopoulos, M, Graves, A, Jäger, M, Lamersdorf, N, Memedemin, D, Mosquera-Losada, R, Pantera, A, Paracchini, M L, Paris, P, Roces-Díaz, J V, Rolo, V, Rosati, A, Sandor, M, Smith, J, Szerencsits, E, Varga, A, Viaud, V, Wawer, R, Burgess, P J and Herzog, F (2019) Agroforestry creates carbon sinks whilst enhancing the environment in agricultural landscapes in Europe. Land Use Policy No 83, 581-593.

[7] McDonald, H, Frelih-Larsen, A, Lorant, A, Duin, L, Andersen, S P, Costa, G and Bradley, H (2021) Carbon farming: Making agriculture fit for 2030. STUDY Requested by the ENVI committee, European Parliament, Brussels.

[8] See: https://www.agforward.eu/index.html.

[9] Kay et al 2019.

[10] Kay et al. (2019) identified priority areas with high accumulated environmental pressures (approx. 10% of total farmland) that could be converted to suitable agroforestry systems.

[11] Shi, L, Feng, W, Xu, J and Kuzyakov, Y (2018) Agroforestry systems: Meta-analysis of soil carbon stocks, sequestration processes, and future potentials. Land Degradation & Development No 29, 1-12.

[12] Sollen-Norrlin, M, Ghaley, B B and Rintoul, N L J (2020) Agroforestry Benefits and Challenges for Adoption in Europe and Beyond. Sustainability No 12 (17), 7001.

[13] Umweltbundesamt (2022) Silvopastoral agroforestry. https://www.ecologic.eu/19048.

[14] Brantly, S (2014) Forest Grazing, Silvopasture, and Turning Livestock into the Woods. National Agroforestry Center.

[15] Burgess, A J, Correa Cano, M E and Parkes, B (2022) The deployment of intercropping and agroforestry as adaptation to climate change. Crop and Environment No 1 (2), 145-160.

[16] Sollen-Norrlin, M, Ghaley, B B and Rintoul, N L J (2020).

[17] Fagerholm, N, Torralba, M, Burgess, P J and Plieninger, T (2016) A systematic map of ecosystem services assessments around European agroforestry. Ecological Indicators No 62, 47-65.

[18] Udawatta, R P and Gantzer, C J (2022) Soil and water ecosystem services of agroforestry. Journal of Soil and Water Conservation No 77 (1), 5A-11A.

[19] Udawatta, R P, Rankoth, L M, Jose, S (2021) Agroforestry for Biodiversity Conservation. In: Udawatta R P, Jose S (eds) Agroforestry and Ecosystem Services. Springer, Cham. And Sollen et al. (2020), see footnote 13.

Silvo-pastoral agroforestry in juniper forest in Soria (Spain), (Guillermo Fernández Centeno)

Agroforestry systems demonstrate positive effects on erosion control, since soils are protected from wind and water erosion by the presence of trees [20]. Research has shown that agroforestry ecosystems improve soil quality and health by improving soil nutrients and protecting soils against nitrate leaching, as well as improving soil fertility and enhancing soil microbial dynamics [21]. Agroforestry trees, particularly leguminous trees, enrich soil through symbiotic nitrogen fixation, the addition of organic matter, and recycling of nutrients [22]. Up to a 65% reduction in erosion and 28% reduction in nitrogen leaching has been observed for soils with the adoption of a silvo-arable agroforestry system using trees such as pine, oak, walnut, wild cherry and poplar in some European regions [23].

In agroforestry systems, an accumulation of litter from leaves and twigs acts as the main source of nutrients and organic carbon [24]. If nitrogen-fixing trees are used, high amounts of nitrogen are added together with the organic material, reducing the use of inorganic nitrogen fertilisers while still achieving optimal yields [25]. Furthermore, agroforestry plots have been shown to boost other nutrients. A wheat-poplar combination managed to incorporate higher levels of nitrogen (N), phosphorus (P), and potassium (K), compared to sole wheat crops. This was largely due to the fixation of atmospheric N and the mineralisation of organic matter [26]. The AgroForAdapt project (see **Annex 1**) brings different stakeholders together to increase the resilience of agricultural systems by promoting agroforestry in Mediterranean countries.

Box 2: Agroforestry with olive trees in Italy

Olive trees are the tree crop species used most frequently in agroforestry systems in Italy. The cultivation of olive trees goes back millennia, usually as part of an agroforestry system. This practice has remained virtually unchanged. Perennial crops grown in olive agroforestry systems tend to offer greater soil erosion control benefits than annual crops. One example is perennial wild asparagus as an understorey crop, which is traditionally consumed in the Mediterranean. Its drought tolerance makes it an appropriate option for the environments in which olives are typically grown. Furthermore, combining olive orchards with poultry systems can deliver environmental benefits by enhancing fertilisation and weed control. Trees also provide chickens with a greater sense of protection from predators, encouraging wider ranging from chickens and stimulating foraging, which can improve the quality of chicken meat. It has also been suggested that certain crops that form part of the Mediterranean diet, such as rocket and species from the sunflower family, can be integrated into olive agroforestry systems to promote agro-tourism.

Source: Paris et al, 2019 [27]

[20] Fagerholm, N, Torralba, M, Burgess, P J and Plieninger, T (2016).

[21] Dollinger, J and Jose, S (2018) Agroforestry for soil health. Agroforestry Systems No 92 (2), 213-219.

[22] See footnote 21.

[23] Sereke, F, Graves, A R, Dux, D, Palma, J H N and Herzog, F (2015) Innovative agroecosystem goods and services: key profitability drivers in Swiss agroforestry. Agronomy for Sustainable Development No 35 (2), 759-770.

[24] Fahad, S, Chavan, S B, Chichaghare, A R, Uthappa, A R, Kumar, M, Kakade, V, Pradhan, A, Jinger, D, Rawale, G, Yadav, D K, Kumar, V, Farooq, T H, Ali, B, Sawant, A V, Saud, S, Chen, S and Poczai, P (2022) Agroforestry Systems for Soil Health Improvement and Maintenance. Sustainability No 14 (22), 14877.

[25] Akinnifesi, F K, Ajayi, O C, Sileshi, G, Chirwa, P W and Chianu, J (2010) Fertiliser trees for sustainable food security in the maize-based production systems of East and Southern Africa. A review. Agronomy for Sustainable Development No 30 (3), 615-629; Koutika, L-S, Zagatto, M R G, Pereira, A P d A, Miyittah, M, Tabacchioni, S, Bevivino, A and Rumpel, C (2021) Does the Introduction of N2-Fixing Trees in Forest Plantations on Tropical Soils Ameliorate Low Fertility and Enhance Carbon Sequestration via Interactions Between Biota and Nutrient Availability? Case Studies From Central Africa and South America. Frontiers in Soil Science No 1; Reise, J, Siemons, A, Böttcher, H, Herold, A, Urrutia, C, Schneider, L, Iwaszuk, E, McDonald, H, Frelih-Larsen, A, Duin, L and Davis, M (2022) Nature-based solutions and global climate protection: Assessment of their global mitigation potential and recommendations for international climate policy. Climate Change Policy Paper 01/2022, German Environment Agency, Öko-Institut e.V., Ecologic Institut, Berlin, Germany.

[26] See footnote 25.

[27] Paris, P, Camilli, F, Rosati, A, Mantino, A, Mezzalira, G, Dalla Valle, C, Franca, A, Seddaiu, G, Pisanelli, A, Lauteri, M, Brunori, A, Re, G A, Sanna, F, Ragaglini, G, Mele, M, Ferrario, V and Burgess, P J (2019) What is the future for agroforestry in Italy? Agroforestry Systems No 93 (6), 2243-2256.

2.1.2. Enhancing biodiversity

Below-ground biodiversity

Agroforestry promotes below-ground soil biodiversity and ecosystem stability through providing a suitable habitat for species [28]. Agroforestry systems have been associated with greater abundance and diversity of bacteria, fungi, protozoa and actinomycetes. Alley-cropping systems with poplar trees have been shown to alter soil bacteria composition and have increased the overall microbial diversity of croplands in Germany [29].

The richness of soil biodiversity varies among tree and shrub species because of differences in exudates [30], plant litter, and biomass [31].

Significant differences can be observed in the abundance of various soil organisms in agroforestry plots, indicating that some organisms respond more strongly to agroforestry management than others [32]. For example, springtails were found to benefit greatly from tree presence, while millipedes and mites, followed by earthworms, centipedes, and nonparasitic nematodes also benefitted from the trees. In contrast, ants, termites, beetles and parasitic nematodes are among the species largely unaffected by tree presence [33]. A study of 13 agroforestry plots in France showed that the biomass and abundance of earthworms was higher in agroforestry plots [34].

Box 3: Agroforestry with hazelnut trees in Belgium

Hazelnut trees have been reported to deliver multiple benefits in agroforestry systems. They can help reduce soil erosion and improve soil health, lower nutrient leaching, protect adjacent waters from fertilisers and pesticides, and increase biodiversity. The hazelnut trees can also increase carbon sequestration.

In Belgium, agroforestry experiments with free-range chickens and hazelnut trees have been carried out. The experiments revealed that the more trees are in contact with chickens, with a short distance to the shelter and a higher number of chickens, the more hazelnut trees produce, with chicken manure influencing tree productivity. In addition, the presence of chickens can reduce the impact of certain insects. Hazelnut trees close to chicken shelters were less damaged by nut weevil.

Source: Jeanmart (2021) [35]

Above-ground biodiversity

Many agroforestry areas are located within Natura 2000 areas, and are frequently recorded as high nature value (HNV) farmland [36]. Typical HNV farmland areas are extensively grazed uplands, alpine meadows and pasture, steppic areas in eastern and southern Europe, and dehesas and montados in Spain and Portugal [37]. Agroforestry can increase above-ground biodiversity by providing food, shelter, habitat, and other resources for multiple species, such as pollinators and birds [38]. Enhancing tree structures across cropland such as in agroforestry systems aims to support biodiversity-friendly landscapes by achieving a large-scale mosaic of more natural habitats [39]. Overall, European silvo-arable systems tend to have greater diversity than cropland, but lower diversity of species than forests [40].

A substantially higher diversity of birds and other taxa such as insects was observed in agroforestry systems. Invertebrates are supported by the presence of trees, and thus provide more food for birds. Grazing has also been shown to have a positive association with tree regeneration compared to areas of taller ungrazed vegetation and scrub: grazing allows more light input into the soil, which explains a higher proportion of seedlings and saplings. Nevertheless, other factors can strongly affect biodiversity in agroforestry, such as habitat type, land-use history and landscape parameters [41]. The precise impacts of agroforestry on pests depend on the crop types, while agroforestry generally increases the prevalence of natural enemies [42].

[28] Harvey, C A and González Villalobos, J A (2007) Agroforestry systems conserve species-rich but modified assemblages of tropical birds and bats. Biodiversity and Conservation No 16 (8), 2257-2292.

[29] Beule, L and Karlovsky, P (2021) Tree rows in temperate agroforestry croplands alter the composition of soil bacterial communities. PLoS ONE No 16 (2), e0246919.

[30] Substance that oozes out from the pores of plant tissues, e.g. resins, gums, oils and lacquers.

[31] Udawatta, R P and Gantzer, C J (2022) Soil and water ecosystem services of agroforestry. Journal of Soil and Water Conservation No 77 (1), 5A-11A.

[32] Barrios, E, Coe, R, Place, F, Sileshi, G and Sinclair, F (2023) Nurturing Soil Life through Agroforestry: The Roles of Trees in the Ecological Intensification of Agriculture, Biological Approaches to Regenerative Soil Systems, pp265-278.

[33] See footnote 32.

[34] Sollen-Norrlin, M, Ghaley, B B and Rintoul, N L J (2020) Agroforestry Benefits and Challenges for Adoption in Europe and Beyond. Sustainability No 12 (17), 7001.

[35] Jeanmart, S (2021) The potential of hazelnut trees (Corylus avellana L.) in an agroforestry context in Belgium and The Netherlands, Gembloux Agro-Bio Tech (GxABT), Université de Liège. (English).

[36] Paracchini, M L, Petersen, J-E, Hoogeveen, Y, Bamps, C, Burfield, I and van Swaay, C (2008) High Nature Value Farmland in Europe - An Estimate of the Distribution Patterns on the Basis of Land Cover and Biodiversity Data. JCR Scientific and Technical Reports EUR 23480 EN, Office for Official Publications of the European Union, Luxembourg.

[37] See footnote 36.

[38] Böttcher, H, Zell-Ziegler, C, Reise, J and Liste, V (2021) Options for Strengthening Natural Carbon Sinks and Reducing Land Use Emissions in the EU.

[39] Tscharntke, T, Grass, I, Wanger, T C, Westphal, C and Batáry, P (2021) Beyond organic farming – harnessing biodiversity-friendly landscapes. Trends in Ecology & Evolution No 36 (10), 919-930.

[40] Mupepele, A-C, Keller, M and Dormann, C F (2021) European agroforestry has no unequivocal effect on biodiversity: a time-cumulative meta-analysis. BMC Ecology and Evolution No 21 (1), 193.

[41] Edo, M, Entling, M H and Rösch, V (2023) Agroforestry supports high bird diversity in European farmland. Agronomy for Sustainable Development No 44 (1), 1.

[42] Pumariño, L, Weldesemayat Sileshi, G, Gripenberg, S, Kaartinen, R, Barrios, E, Nyawira Muchane, M, Midega, C and Jonsson, M (2015) Effects of Agroforestry on Pest, Disease and Weed Control A Meta-Analysis. Basic and Applied Ecology No http://dx.doi.org/10.1016/j.baae.2015.08.006.

2.2. Economic and social benefits of agroforestry

As shown above in section 2.1, agroforestry can help to improve the resilience of agricultural systems by mitigating the impacts of climate hazards. Trees provide shading that protects crops from extreme heat by lowering mean air temperatures [43]. Agroforestry can also help improve water retention and draw water from deeper soil layers, which can be particularly beneficial for crops experiencing prolonged droughts. Moreover, trees can also form windbreaks to protect crops from heavy winds during storms [44]. These environmental benefits can improve the stability of crop yields. Evidence has shown, for example, that large walnut trees reduce heat and water stress for wheat, resulting in a higher stability of wheat yields compared to monocultures [45].

Agroforestry can improve agronomic productivity compared to sole cropping, i.e. growing one crop alone in stands [46]. Using the Land Equivalent Ratio (LER [47]), it can be shown that agroforestry can result in higher productivity than monocultures [48]. Various types of agroforestry were tested, such as traditional silvo-pastoral systems and alley cropping, but also fruit trees intercropped with vegetables. The tested agroforestry systems managed to increase productivity by 36-100%.

Furthermore, agroforestry trees allow farmers to diversify their production, and therefore increase farm stability. Trees can constitute new sources of income for farmers, and tree products include fruit, timber, firewood, gums or fodder [49]. If such products can be sold at premium prices, agroforestry can increase economic competitiveness [50]. Through increasing the attractiveness and diversity of landscapes, agroforestry systems can increase an area's recreational and cultural value by providing multiple services [51], for instance, recreation and nature-based tourism [52]. Nonetheless, the potential revenues depend on multiple aspects - the types of trees, soils, environmental conditions and the price of the goods generated influence the profitability of agroforestry systems.

Agroforestry can reduce costs for farm inputs and increase the overall income earned by farmers. With certain agroforestry practices, the amount of chemical fertilisers, pesticides or other inputs applied decreases [53]. Moreover, trees in agroforestry systems can replace the construction of shelters for animals or fences. However, adequate knowledge of agroforestry practices is required in order to ensure optimal plant-tree selection. Unsuitable crop or tree components may cause increased competition for nutrients, which can reduce yields [54].

Lastly, the improved micro-climate and shade in agroforestry systems may be beneficial for grazing animals and increase animal welfare. Farm workers also benefit from the shade improving overall health and working conditions.

3. Agroforestry in selected Member States

3.1. Overview of agroforestry in the selected Member States

Historical development

The six Member States that are the focus of this report show differences in biogeographical zones, predominant agricultural land use, support provided for agroforestry in the 2014-2022 Rural Development Plans (RDPs), and planned support in the 2023-2027 CSPs. The differences in these key characteristics in the six Member States are summarised in Table 1.

[43] Gomes, L C, Bianchi, F J J A, Cardoso, I M, Fernandes, R B A, Filho, E I F and Schulte, R P O (2020) Agroforestry systems can mitigate the impacts of climate change on coffee production: A spatially explicit assessment in Brazil. Agriculture, Ecosystems & Environment No 294, 106858.

[44] Schoeneberger, M, Bentrup, G, Gooijer, H d, Soolanayakanahally, R, Sauer, T, Brandle, J, Zhou, X and Current, D (2012) Branching out: Agroforestry as a climate change mitigation and adaptation tool for agriculture. Journal of Soil and Water Conservation No 67 (5), 128A-136A.

[45] Reyes, F, Gosme, M, Wolz, K J, Lecomte, I and Dupraz, C (2021) Alley Cropping Mitigates the Impacts of Climate Change on a Wheat Crop in a Mediterranean Environment: A Biophysical Model-Based Assessment. Agriculture No 11 (4), 356.

[46] See https://www.fao.org/4/t0742e/T0742E06.htm.

[47] LER compares the yields from growing two or more components (e.g. crops, trees, animals) together with yields from growing the same components in monocultures. See https://www.fao.org/agroecology/knowledge/10-elements/efficiency/en/.

[48] Lehmann, L M, Smith, J, Westaway, S, Pisanelli, A, Russo, G, Borek, R, Sandor, M, Gliga, A, Smith, L and Ghaley, B B (2020) Productivity and Economic Evaluation of Agroforestry Systems for Sustainable Production of Food and Non-Food Products. Sustainability No 12 (13), 5429.

[49] See: Burgess, A J, Correa Cano, M E and Parkes, B (2022) The deployment of intercropping and agroforestry as adaptation to climate change. Crop and Environment No 1 (2), 145-160. Or Quandt, A, Neufeldt, H and Gorman, K (2023) Climate change adaptation through agroforestry: opportunities and gaps. Current Opinion in Environmental Sustainability No 60, 101244.

[50] Thiesmeier, A and Zander, P (2023) Can agroforestry compete? A scoping review of the economic performance of agroforestry practices in Europe and North America. Forest Policy and Economics No 150, 102939.

[51] Fagerholm, N, Torralba, M, Burgess, P J and Plieninger, T (2016) A systematic map of ecosystem services assessments around European agroforestry. Ecological Indicators No 62, 47-65.

[52] Sollen-Norrlin, M, Ghaley, B B and Rintoul, N L J (2020) Agroforestry Benefits and Challenges for Adoption in Europe and Beyond. Sustainability No 12 (17), 7001.

[53] Martinelli, G d C, Schlindwein, M M, Padovan, M P, Vogel, E and Ruviaro, C F (2019) Environmental performance of agroforestry systems in the Cerrado biome, Brazil. World Development No 122, 339-348.

[54] Mukhlis, I, Rizaludin, M S and Hidayah, I (2022).

Table 1: Characteristics and CAP support for agroforestry in selected MS

Member State	UAA predominant land use	EU biogeographic zone(s)	M 8.2 [55] programmed in 2014-2022 RDP	AF support in CSP 2023-2027
BE-FL	A G	Atlantic	Yes	Yes
CZ	A G (Pc)	Continental	No	Yes
FR	A G Pc	Atlantic, Continental, Mediterranean	Yes	(Yes) [56]
EL	G A Pc	Mediterranean	Yes	Yes
IT	A G Pc	Mediterranean, Continental, Alpine	Yes [57]	Yes
ES	A G Pc	Mediterranean	Yes	Yes

Key to table: UAA = utilised agricultural area; A = arable; G = grassland; Pc = permanent crops; (Pc) = permanent crops are not predominant. (Yes)=Support for AF but no intervention specifically dedicated to exclusively support AF

Source: EU CAP Network (2023) [58] and EEA [59]

Historically, traditional agroforestry practices are rooted in a country's cultural traditions. In Mediterranean countries, silvo-pastoral systems have been widely established in the past. Agroforestry systems in Spain are based on ancient agricultural practices still widely implemented. Specifically, the dehesa is an agro-silvo-pastoral system combining grazing, forestry and, to a lesser extent, extensive rainfed crops, which has existed for centuries, mainly in the centre and southwest of the country. There are other similar silvo-pastoral systems in mountainous and northern areas, which combine livestock and forestry. In Spain, the main reason for the existence of agroforestry systems is the low agricultural productivity in the areas where they are located, either because of soil or climate conditions, or a combination of these factors. For example, in pastures with holm oaks, to maximise the production of acorns, it is necessary to select the best trees with the best acorns, requiring a lower density of trees, which must be pruned to maximise their crown and enhance the production of acorns. In Greece, agroforestry has been practised since ancient times, combining oak and olive groves with grazing systems or cultivation of cereals. Agroforestry systems have also been present in Italy for 3,000 years, from the Etruscans and Romans onwards. An example is the vite maritata (married vine) where grape vines are cultivated on living trellises. Moreover, after the Roman reforms, emperors gave a land parcel to soldiers who returned from wars as a reward to satisfy the need for self-sufficiency of the family, providing wood, agricultural goods and livestock.

Box 4: Agroforestry with olive trees in Greece

Olive trees are a widely cultivated tree in Greece. In fact, olive groves cover approximately 806,600 ha of the country. They are grown in combination with animals, wheat, corn, alfalfa, and fava beans, among others. Olive trees are sometimes grown in pure orchards but are mostly grown in mixtures with other forest or fruit species. The olive trees are usually grown to produce edible olives and olive oil, however, the pruned branches from olive trees can also be used as fuel or provide fodder. Olive-based agroforestry in Greece can also help protect crops from frost and extreme temperatures, enhance nutrient cycling and increase carbon sequestration. The Agforward project examined the benefits of a chickpea-olive tree agroforestry system in Molos, Central Greece, where the chickpeas provided additional farm income and required lower chemical inputs compared to the control treatment (olive trees alone).

Source: Pantera et al, 2017 [60] and Papanastasis et al, 2008 [61]

[55] Measure to support the establishment, regeneration or renovation of agroforestry systems (Art. 23 of Regulation (EU) 1305/2013).

[56] Eco-scheme – bonus for hedges (see section 4.1).

[57] Activated in only five regions.

[58] See: https://eu-cap-network.ec.europa.eu/publications/analytical-work-supporting-establishment-agroforestry-systems_en.

[59] See: https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-2.

[60] Pantera, A, Papadopoulos, A, Kitsikopoulos, D, Mantzanas, K, Papanastasis, V and Fotiadis, G (2017) Lessons learnt: Olive agroforestry in Molos, Central Greece.

[61] Papanastasis, V, Mantzanas, K, Dini-Papanastasi, O and Ispikoudis, I (2008) Traditional Agroforestry Systems and Their Evolution in Greece, Agroforestry in Europe, pp89-109.

In France, hedgerow systems fall under the definition of agroforestry and date back many centuries; they usually incorporate high or medium-stem trees. The usage of bocage, comprising trees in hedges or scattered in fields, is generally associated with ruminants, and can bring multiple benefits. Trees can help limit damage from floods and winds and reduce erosion. Integrating such vegetative elements provides shade to animals, preserves biodiversity, and increases attractiveness through landscape enhancement. Hedges can also be valuable for the production of wood energy, timber or fodder for livestock [62].

In Czechia, agroforestry was traditionally practised on small family farms, while in the past in Flanders (Belgium), agroforestry systems have not been widespread [63]. In Czechia, agroforestry was quite common in the mid-19th century, particularly silvo-pastoral agroforestry systems in the mountainous forested regions. With the industrialisation and mechanisation of agriculture from the beginning of the 20th century and especially after World War II, there has been a decline in agroforestry systems in all six Member States in favour of more intensive agriculture, including the simplification of crop rotations and an increase in input-intensive farming practices. Flanders (Belgium) reported that the intensification of agricultural crop production, the increasing use of barbed wire, and especially the mechanisation of agriculture, led to a lack of space for trees on agricultural land. In Czechia, with the collectivisation of farming during communist rule after World War II, land parcels were merged into large blocks for specialised production, and agroforestry systems almost completely disappeared.

In recent years agroforestry has been experiencing a "revival" for various reasons (see also section 3.2). In France, the current revival can be explained by a growing awareness of the need to reconcile agricultural production with environmental protection. Agroecological benefits and ecosystem services, such as habitats and resources for wildlife, erosion control, and improvement of water and soil quality have stimulated this new approach, supported by public policies favourable to agroforestry and the agroecological transition. In Flanders (Belgium), the trigger was the gradual disappearance of trees from the agricultural landscape in many areas, and the wish to maintain trees due to their environmental benefits and ecosystem services. For all countries, agroforestry is part of a strategy to transition towards more productive and sustainable forms of land use through a focus on ecosystem services. Support has been provided since 2012 after mid-term changes during the CAP period 2007-2014, following requests from stakeholders. As a current trend, food forests are becoming increasingly popular. Projects like the AGFOSY project (see Annex 1) aim to overcome the structural constraints of large fields in countries under the influence of the former Soviet Union, such as Czechia, and exchange best practices.

Table 2: Overview of the extent of agroforestry in the six selected countries

Member State	Extent and presence of agroforestry in the country
BE-FL	Agroforestry is spread over Flanders. By early 2024, around 250 farmers received support.
CZ	Agroforestry systems have been established from 2023 according to the definition stated in government regulation. Previous to this regulation, these systems did not officially exist.
FR	Agroforestry is present across the whole country, but takes a variety of forms, including hedgerows, orchards and tree-lined plantations: these forms and the density of agroforestry systems vary from one French region to another. It is currently estimated that there are 750,000 km of hedgerows in France.
EL	There is official census data about the type and the extent of agroforestry systems in Greece. Agroforestry systems do not appear in the cadastre maps because Greece does not recognise them as a distinct land use; they are categorised either as agricultural or forest land. Agroforestry systems are present in different regions, mainly in West Greece and on islands such as Lesbos or Crete. According to estimates, almost 30% of agricultural land and an equivalent percentage of forest land are covered by agroforestry systems [64]. Silvo-arable systems are exclusively found on agricultural land, which is privately owned. Contrarily, silvo-pastoral systems are found in forest land belonging to the state, and are communally used by livestock owners. This land is supposed to be leased to farmers, a procedure that ought to have begun in 2017, but for bureaucratic reasons it has not yet been implemented [65].
IT	Agroforestry is mainly in hilly regions and mountains as a silvicultural system. In the CAP period 2014-2022, 5 of the 21 regions (Basilicata, Marche, Apulia, Umbria and Veneto) allocated budget for the AF measure, but only 2 regions activated it.
ES	Dehesas are located mainly in the centre and southwest of Spain, covering an estimated area of 3.5 million hectares. Other traditional agroforestry systems such as soutos (in Galicia), combine livestock use, forestry and chestnut production, or other silvo-pastoral systems where livestock use is combined with forestry and hunting.

Source: Interviews and EURAF

[62] Malignier, N and Balaguer, F (2017) Current Extent and Trends of Agroforestry in France.

[63] But nevertheless, traditional landscapes in Flanders were often also a form of agroforestry, e.g. poplar meadows, fruit orchards, wooded borders, pollard willow row.

[64] Papanastasis V.P., Mantzanas K., Dini-Papanastasi O., and Ispikoudis I. (2009): Traditional Agroforestry Systems and Their Evolution in Greece in A. Rigueiro-Rodríguez et al. (eds.), Agroforestry in Europe: Current Status and Future Prospects. Springer Science + Business Media B.V. 2009.

[65] See footnote 64.

Drivers and key actors for agroforestry in the selected countries

All the Managing Authorities interviewed seek to achieve environmental benefits through supporting agroforestry systems (see section 2.1). Italy, for instance, is a country with a high risk of landslides and floods, which are becoming more frequent due to climate change. Moreover, in southern and central Italy, desertification is a risk in some areas, and agroforestry is viewed as an important mitigation and adaptation measure for both sets of risks.

France is committed to an agroecological transition and agroforestry, and the restoration of the value of hedgerows is seen as a lever to reach this transition. This is based on the conviction that hedgerows provide ecological and agronomic benefits, such as soil and water retention, the creation of refuge areas for animals, the establishment of ecological corridors, the preservation of biodiversity, and carbon sequestration. Over the past 50 years, hedgerows have continued to disappear to a significant extent, and are still often considered to be an economic constraint. As part of the transition, there is also an intention to encourage better use of the products and services provided by hedgerows, by adopting ecosystem, land-based, and economic approaches. The aim is to raise awareness among owners and managers of the economic and ecological value of hedgerows, while putting in place sustainable management which guarantees their long-term preservation.

Supporting the whole value chain, from seeds and plant nurseries to economic exploitation of hedge products, is an essential aspect of this transition in France.

In Flanders (Belgium), agroforestry plays an important role due to its contribution to climate mitigation, the improvement of natural resources, such as water or soil, and biodiversity. The presence of diverse fauna and flora in an agroforestry system can provide stepping stones to help connect habitats. One of the key drivers for supporting agroforestry is its contribution to sustainable business models via the opportunities it provides for diversification and increasing resilience. In addition, in Spain, by bringing different economic activities together through agroforestry systems, these activities become more economically viable, thereby helping to maintain rural communities that are otherwise threatened by abandonment.

The revival of, or growing interest in agroforestry is driven by different actors in the different countries. In Czechia or Flanders (Belgium), for instance, agroforestry was first driven by bottom-up initiatives. The Czech association for agroforestry is an initiative created by researchers and farmers, many of whom are organic practitioners. It started by providing practical information for farmers, then approached the Czech Ministry for Agriculture and co-designed measures that could be supported under the CAP (see section 4.1).

Silvo-pastoral agroforestry system in Flanders, (Agency for Agriculture and Fisheries)

In Flanders (Belgium), two consecutive research projects have driven an increased focus on the benefits of agroforestry in the past few years. The Consortium for Agroforestry [66] was established to reintroduce this specific cultivation system for both crops and livestock in Flanders. It is a collaborative effort that conducts scientific research, provides support to farmers, and engages in policy feedback. The consortium comprises various partners, including the University of Ghent, ILVO [67], and Inagro [68], among others. It provides advice to farmers, organises demonstrations, and supports farmers in designing their agroforestry systems.

In Spain, the main actors promoting the value of dehesas are the owners of land with these traditional agroforestry systems or, where appropriate, the managers of these areas. They are also the ones who lead innovative projects and promote, as much as possible, the outputs from these systems, as well as trying to quantify and value the services they provide to society as a whole in order to be able to continue maintaining them.

In Italy, CREA [69] is the main actor involved in stimulating the debate on agroforestry, and in particular aims to highlight the environmental and socio-economic advantages these systems bring, including for rural livelihoods and social well-being.

Agroecology has formed part of the French political agenda since the 2014-2022 CAP period. Former Minister for Agriculture Stéphane Le Foll wanted to give an impetus to agroforestry as part of a broader strategy to promote agroecological practices. During the initial phase, no monetary incentives were planned: the focus was on awareness raising and the promotion of agroforestry as a sustainable practice. With the recovery plan [70], France launched its first financial aid for hedges, focusing on their planting (€45 million for 2021-2022). Now a number of influential actors support and promote agroforestry in France (see also section 4.2). For example, local authorities and regional councils play a key role in the promotion of agroforestry alongside the AFAC-Agroforestry association [71], the French Office for Biodiversity, research organisations such as INRAE [72] or CIRAD [73], and advisory services.

In almost all of the six countries, some farmers, often but not exclusively organic practitioners, can be described as pioneers or early adopters of agroforestry. At the same time, some farmers, for instance in Greece, might practice agroforestry without being aware of agroforestry concepts, implementing traditional practices. Traditional agroforestry systems in Greece are numerous, thus making Greece one of the richest countries in Europe in the extent of its agroforestry systems. However, due to regulatory uncertainties or insufficient knowledge about its environmental benefits, farmers are often reluctant to adopt agroforestry (see section 3.2). This has often led to a low uptake of agroforestry measures under the CAP, where these have been available.

Silvo-arable systems with oak trees in the margins of cereal farms in Greece, (Vasilios Papanastasis)

[66] See: https://www.agroforestryvlaanderen.be/en.

[67] Flanders Research Institute for Agriculture, Fisheries, and Food.

[68] Research & advice in agriculture and horticulture.

[69] Italian research organization dedicated to the agri-food supply chains.

[70] https://agriculture.gouv.fr/france-relance-le-volet-transition-agricole-alimentation-et-foret.

[71] French Association of Country Trees and Agroforestry.

[72] French National Research Institute for Agriculture, Food and the Environment.

[73] French Agricultural Research Centre for International Development.

3.2. Key barriers and opportunities for the maintenance, restoration or establishment of agroforestry

Key barriers

In all six Member States, several factors that hinder the maintenance, restoration or establishment of agroforestry can be identified.

Key barriers include land ownership and access to land, as well as uncertainty regarding economic profitability. Flanders (Belgium) is one of the most densely populated areas of Europe, and agricultural land is scarce and under intensive production.

In Czechia a substantial part of agricultural land is under rental agreements, and farmers are reluctant to plant trees, as they need agreement from the landowners, who would remain the owners of the trees, once planted.

Box 5: Barriers for the establishment of agroforestry in Czechia before CAP 2023-2027

As indicated above, agroforestry was not defined in Czech legislation, being unrecognised as a land use system in its Land Parcel Identification System (LPIS) until very recently. This lack of legal recognition has been identified as one of the key obstacles in preventing more widespread adoption in the country. As a result, there is very little evidence of modern agroforestry practices in Czechia, and only an extremely small area is dedicated to traditional agroforestry – less than 1% of utilised agricultural area. Although recent surveys indicate that there is a high level of interest in agroforestry, high start-up costs and labour requirements, as well as uncertainties in profitability, are among the main concerns for Czech farmers. However, the biggest concern among farmers is the bureaucracy associated with its establishment due to the lack of a legal framework. Before legal recognition, the Czech Agricultural Act and associated directives and regulations stated that only one crop group could be established on a part of a farmer's block (registered in LPIS). This excluded the combination of crop or grassland with a tree component, and disqualified trees (except fruit trees) from being recognised as a productive component. In addition, woody vegetation growing outside forests was protected according to the Nature and Landscape Protection Act, and therefore could not be managed and harvested without specific permission. For subsidies, the area covered by woody vegetation on fields was ineligible for basic payments, or classed as a Landscape Feature in LPIS. In addition to legal barriers, local knowledge gaps have also been identified as a problematic barrier – since agroforestry has not yet been widely implemented in Czechia, local farmers have very little experience and knowledge of its ecological, technical, and administrative aspects.

Sources: Lojka et al (2021) [74] and Krčmářová et al (2021) [75]

Planting trees involves a long-term commitment, and the uncertainty regarding the economic benefits of agroforestry systems can constrain their uptake, especially if the existing land use is profitable. Flanders (Belgium) reports market challenges in selling products from agroforestry systems such as wood from trees, fruit harvests, and other additional products, due to the smaller scale of these systems. In Spain, the low profitability of agroforestry systems is hindering wider uptake. The AF4EU and Reforest projects are examples of transnational projects (see **Annex 1**) working on the promotion of agroforestry by supporting knowledge exchange and the development of viable business models for agroforestry.

Sometimes farmers perceive trees on agricultural land to be a constraint. Maintaining trees adds to farmers' workload. Legislative requirements in the past restricted CAP funds: trees on agricultural land over a certain density were not eligible for CAP funding. Because of such funding rules, farmers would deliberately remove trees from their agricultural land, and thus, even though rules have changed, farmers remain hesitant to plant new trees. Awareness raising at the Member State level is needed to overcome this. In Italy, at the time of writing this report, a national survey was ongoing, addressed to regional managing authorities and agricultural enterprises, to better understand the reasons why the agroforestry measures in the previous CAP period 2014-2022 were not successful.

Often agroforestry systems fall under the competencies of different Ministries, which causes confusion. In Greece, Italy, Spain, and Flanders (Belgium), this causes issues with the implementation of agroforestry practices. Conditions for planting or permits for cutting might be required from different authorities. Definitions of agroforestry are not always in place, and there can be contradictions between definitions and requirements for agroforestry and forestry systems which cause implementation issues and confusion.

Lack of knowledge about the establishment of agroforestry systems, including their design [76] and maintenance, is identified as an obstacle to maintaining, restoring, or establishing agroforestry systems. Advisory services have a key role to play in overcoming this, however some Member States reported that the current advisory systems do not support more agroecological practices, such as agroforestry, but rather focus on more conventional production practices (**see section 4.1**).

[74] Lojka, B.; Teutscherová, N.; Chládová, A.; Kala, L.; Szabó, P.; Martiník, A.; Weger, J.; Houška, J.; Červenka, J.; Kotrba, R.; et al. Agroforestry in the Czech Republic: What Hampers the Comeback of a Once Traditional Land Use System? Agronomy 2022, 12, 69.

[75] Krčmářová, J.; Kala, L.; Brendzová, A.; Chabada, T. Building Agroforestry Policy Bottom-Up: Knowledge of Czech Farmers on Trees in Farmland. Land 2021, 10, 278.

[76] Including combination of species used, array, density etc.

Opportunities

The potential of agroforestry in fostering the climate resilience of agriculture is perceived as being one of the main opportunities for encouraging the adoption of agroforestry systems more widely. For example, parts of Czechia are becoming dryer, and farmers have the possibility of introducing tree species from Southern Europe to better adapt to the changing conditions in their agroforestry systems. This measure should also help mitigate soil erosion.

Given the importance of agroforestry systems in the conservation of many ecosystems, and to minimise risks arising from climate change, these systems are seen to play an important role in contributing to the implementation of the Nature Restoration Law and national plans that are to be developed.

To maximise the environmental benefits of agroforestry (see section 2.1), supportive policies, financial incentives, raising farmers' awareness and promoting the environmental and economic benefits are crucial: in France these are issues supported by the governmental "Hedge Pact" (see section 4.2). The exchange of knowledge and collaboration between players in the agricultural sector, scientists, and decision-makers are essential.

In France and Italy, income diversification, through the integration of different types of production on the same plot of land, is viewed as one of the main opportunities associated with agroforestry systems. Examples include the sale of wood or cork products, as well as fruits and related products.

Box 6: Agroforestry with chestnut trees in Spain

Sweet chestnut (Castanea sativa Mill.) is an important tree species in the Iberian Peninsula. Chestnut agroforestry systems have been in place and actively managed for centuries in Spain. These agroforestry systems can deliver a wide range of ecosystem services. Specifically, a low tree density with increased light exposure can help produce high-quality chestnuts and maximise fruit production. Chestnut agroforestry can provide materials for construction, or generate biomass for energy purposes. Furthermore, integrating chestnut trees into agricultural systems can serve to regulate the local climate (e.g. temperatures and winds), enhance carbon sequestration, and provide greater erosion control. Chestnut agroforestry also plays a role in recreational usage, as well as conserving traditional knowledge related to landscape management. Although other types of agroforestry can deliver certain ecosystem services, chestnut-based systems have been shown to be particularly multifunctional.

Source: Roces-Díaz et al, 2018 [77]

4. Role of agroforestry in CSPs and other policy instruments

4.1. Instruments used in CSPs to support the maintenance, restoration, or establishment of agroforestry

Overview

In the 2023-2027 CAP period, nine CSPs planned 17 interventions directly linked to agroforestry (see Annex 3) [78]. There is no dedicated output indicator for agroforestry, but Member States must report the area of **new** agroforestry (Result Indicator 17.3) and woody landscape features (Result Indicator 17.4). However, there is no data available in the public domain on the targets set for these sub-indicators or progress towards achieving them.

All interventions planned for agroforestry are linked to one or more specific objectives linked to the environment (SO4, 5 and 6 [79]). Italy and France also link their interventions to SO1 and SO9 respectively [80]. Table 3 gives an overview of CSP objectives to which agroforestry is expected to contribute, and interventions used in the six Member States are analysed.

[77] Roces-Díaz, J V, Diaz-Varela, E, Anta, M and Álvarez-Álvarez, P (2018) Sweet chestnut agroforestry systems in North-western Spain: Classification, spatial distribution and an ecosystem services assessment. Forest Systems No 27.

[78] Although other interventions may be used to support agroforestry, these are not listed in the Annex as they are not directly/solely linked to agroforestry.

[79] SO4 = climate change action, SO5 = environmental care, SO6 = to preserve landscapes and biodiversity.

[80] SO1 = ensure a fair income for farmers, SO9 = fostering knowledge and innovation.

Table 3: Objectives and support for agroforestry in six CSPs

Member State	Interventions	CAP SOs	Goals to which AF is expected to contribute[81]
BE-FL	*Non-productive investments for environmental and climate objectives: Planting payments	SO4, SO5, SO6	Climate, Biodiversity, Efficient and sustainable natural resource management
	Environmental climate commitments: Maintenance of agroforestry systems	SO4, SO5, SO6	
CZ	Investment measure: Setting up an agroforestry system	SO4	Climate, Biodiversity, Diversification of farm income
	Environmental climate commitments: Caring for an established agroforestry system	SO4, SO5, SO6	
FR	*Eco-scheme: bonus on hedgerows	SO4, SO5, SO6, SO9	Climate, Soil health, Biodiversity, sustainable natural resource management
EL	*Non-productive investment for afforestation[82]	SO4, SO5, SO6	Biodiversity, Soil health, Water management
	Eco-scheme: Improvement of agroforestry ecosystems rich in landscape elements	SO4, SO5, SO6	
IT	Investment measure: Afforestation/creation of woodland and agroforestry systems on agricultural land	SO1, SO4, SO6	Biodiversity, Soil health, Climate
	Environmental climate commitments: Support for maintaining afforestation and agroforestry systems	SO4, SO5, SO6	
ES	Non-productive forest investments in afforestation and agroforestry systems	SO4, SO5, SO6	Carbon sequestration, Soil health, Water management, Biodiversity
	Environmental climate commitments: Commitments to maintain afforestation and agroforestry systems	SO4, SO5, SO6	

*not exclusively linked to agroforestry

Source: Catalogue of interventions[83] and interviews

[81] Source: Interviews.

[82] The intervention links to afforestation on agricultural land and is not formally linked to agroforestry. However, interviews revealed that it can be used to establish agroforestry systems, if max. 250 trees ha is not exceeded.

[83] See: https://agridata.ec.europa.eu/extensions/DashboardCapPlan/catalogue_interventions.html.

Definitions

Member States are required to define agroforestry in their CSPs. Some definitions include a maximum stocking density of trees per hectare, while a few also define which species may be planted. Table 4 provides an overview of the definitions of agroforestry given by the six Member States.

Table 4: Definitions of agroforestry in six MS

Member State	Definition of agroforestry in CSPs
BE-FL	Systems where trees are combined with agriculture on the same land. To be considered agroforestry, the following requirements apply: a) minimum of 30 trees/ha; b) a max of 200 trees/ha; c) homogeneous distribution of trees over the plot. Parcels planted with EAFRD [84] support can have higher densities. Derogation of max. threshold possible if justified (e.g. planting of more trees but fewer maintained in the long run). Negative list for certain tree species (e.g. exotic invasive species) in place.
CZ	Combination of agriculture and trees on the same land. Czech legislation established a maximum of 100 trees/ha (not counting in fruit trees already existing on the block), in accordance with Commission Delegated Regulation (EU) No 640/2014, research recommending a density of no more than 100 trees/ha (for some species). Silvo-arable systems: arable land on which linear tree planting of a maximum of 100 trees/ha has been established in accordance with Regulation (EU) 2021/2115 of the European Parliament and of the Council. The Czech Regulation specifies that on one hectare you cannot have more than 40% of one tree species, so at least three different species need to be planted per hectare. The trees must be more than 120 cm in height when planted, and are usually 2-4 years old. It is important to protect them on agricultural land. In the case of fruit trees, annual pruning is needed. It is necessary to take care of the strips of arable land on which the trees are planted, etc. A negative list of species with invasive potential has been established. Two types of agroforestry systems: Silvo-arable systems – arable land on which linear tree planting (alley cropping) has taken place. Silvo-pastoral systems –permanent grassland on which linear, scattered or grouped tree planting occurs.
FR	The term "agroforestry" relates to systems of land use and to agricultural practices in which perennial woody vegetation is voluntarily integrated to crops and/or grazing patches on the same management unit. Trees can be isolated, in rows or in groups inside crop plots ("intra-plot agroforestry"), or inside grasslands ("wood pasture"), or along the margins of plots (hedgerows or trees in rows). The threshold is considered to be under 100 trees/ha.
EL	Agroforestry systems are systems with scattered trees or trees in rows, or on the margins of plots. They can be either forest trees (oaks, pines, poplars, cypresses) or fruit trees (citrus, apple and stone fruit trees, acacia, olives, carob, and mastic trees). They can be combined with the cultivation of cereals, horticultural crops, fruit and vegetables, and/or grazing. Trees, if planted in rows, should have a minimum distance of 10 metres between rows, the distance between trees in the same row should be greater than 4 metres. Trees may also be present at the boundaries of the field in the form of a living fence to protect the agricultural crop from the wind and to create a zone that will support wildlife. The maximum number of trees is 250 trees/ha. Agroforestry also includes partially forested areas (sparse forests) of pasture with the tree cover up to 40% and understorey including herbaceous and woody vegetation. In this case the minimum tree density may be 5 trees/ha, and the maximum 40 trees/ha depending on the slope, tree species and climatic conditions.
IT	Agroforestry systems comprise all agricultural systems in which the cultivation of perennial tree or shrub species of forest interest are combined with arable land, with the possible presence of an animal component on the same surface, with the aim of improving the sustainable use of the soil on which agricultural activities, with the possibility of diversifying farm production by providing valuable timber, biomass, non-wood secondary products such as truffles, cork, acorns, and honey, alongside agricultural and livestock products. In cases where perennial tree and shrub species are present on arable land, these must have a density of max. 250 trees/ha.
ES	Land use systems that combine the maintenance of trees with agriculture or grazing on the same land. The maximum number of trees will be determined by regional authorities. For arable areas this may not exceed 100 trees/ha, except in the case of investments. Managing Authorities may also set a minimum number of trees. Agricultural hectares falling within the national definition of forest shall be eligible for support, provided that it can be established that agricultural activity takes place on these hectares, and that the agricultural practices carried out on these hectares do not benefit from double funding with the requirements or commitments for rural development support for forestry areas. For permanent pasture areas there will be no maximum number of trees established per hectare, but the threshold will be based on a pro-rata calculation based on ineligible features. As above, areas which meet the national definition of forest will be eligible for basic payments providing that no double funding is apparent. The definition of dehesa is set out in the national forestry law.

Source: EURAF Policy Brief 22 Agroforestry Definitions in the New CAP (zenodo.org), interviews

[84] European agricultural fund foxxr rural development.

Interventions used

In five out of the six CSPs (all but France), either the establishment or maintenance of agroforestry or both may be supported by an intervention specifically dedicated to agroforestry. Other interventions, e.g. advice or non-productive investments, may also support agroforestry (see table 3).

In Flanders (Belgium) currently, there are two interventions that can be used to support agroforestry systems. The first measure is the planting payment (intervention 3.26 'VLIF non-productive investments for environmental and climate objectives'), which entails reimbursing 75% of the purchase costs, labour, and machinery costs for planting, as well as expenses for the protection of the trees. This intervention was also available in the previous CAP period and has been only slightly adjusted: it is no longer a separate intervention for agroforestry alone, but is part of the VLIF-support for non-productive elements, and the support rate has been aligned with the other options under this intervention. The second intervention (intervention 3.7 'Maintenance of agroforestry systems') was newly introduced. This provides payments for the maintenance of agroforestry systems, which involves a five-year agri-environment-climate commitment by the farmer for the upkeep of the trees and the strips between them.

In Czechia there are two interventions related to agroforestry: one investment intervention for setting up an agroforestry system (intervention 42.73), and one five-year agri-environment-climate commitment for the management of an established agroforestry system (intervention 26.70). The target for the CAP period 2023-2027 was set relatively low at 900 ha for each of the two interventions, due to past experiences with low uptake of measures regarding the afforestation of agricultural land. In early 2024, initial figures indicate that uptake for the agroforestry investment intervention was surprisingly high, reaching 610 ha (as opposed to the planned 150 ha/year). The Managing Authority is currently assessing options for further developing support for agroforestry systems.

In Italy, agroforestry was already an intervention in the 2014-2022 CAP period. However, only a few regions (5 out of 21) activated the intervention, and uptake by farmers happened in only two of these, accounting for less than 1% of the planned budget. For the CAP period 2023-2027, six regions (Piemonte, Puglia, Sicily, Tuscany, Umbria and Veneto) activated the two agroforestry interventions (SRD05 – creation of agroforestry, SRA28 – support for maintaining agroforestry systems).

Greece planned an annual eco-scheme for the maintenance of agroforestry systems (intervention ΤΤ1-31.5 - Improvement of agroforestry ecosystems rich in landscape elements). There is no dedicated intervention for the establishment of agroforestry systems in Greece. However, the intervention on non-productive investments for the establishment of forestry plantations (intervention ΤΤ3-73-3.4) can support agroforestry systems if a maximum of 250 trees per hectare is planted [85].

Silvo-pastoral system with sheep in a pine forest in Greece, (Vasilios Papanastasis)

[85] Source: Interviews.

The French CSP does not include any measures directly linked to agroforestry. However, the French eco-scheme includes a bonus for hedgerows in line with the objectives and activities set out within the "Hedge Pact" (see section 4.2).

The Spanish CSP includes two interventions directly related to agroforestry: for the establishment of intervention 6881.1 for non-productive forest investments and agroforestry systems, and a five-year environmental and climate commitment for maintaining an agroforestry system (intervention 6502.2). In addition, there are several other interventions supporting dehesa systems, including non-productive investments in forest damage (e.g. fire or wind), prevention and restoration (interventions 6881.2 and 6881.3), or other non-productive investments for climate and environmental objectives (6844 and 6881.4). There are also agri-environmental commitments for other silvicultural actions, as well as for commitments on grazing (6502.1 and 6501.3).

Role of advisory systems

All interviewees highlighted the pivotal role of advisory services in supporting agroforestry. However, advisory systems function very differently across the countries, and sufficient or suitable advisory services tailored for agroforestry are not available to farmers everywhere. None of the six selected CSPs includes an advisory intervention explicitly mentioning agroforestry as a focus area, but support can be claimed under more general measures on advice.

In Flanders (Belgium), the 'Tailor-made training and advice' intervention consists of two components: a supply-driven component and a demand-driven component. This intervention focuses on providing farmers with customised training and advice to meet the specific objectives of the CAP. The training and advice can cover various topics and themes, in line with policy priorities and economic, environmental, and social dimensions. The aim is to make farmers knowledgeable, competent, and innovative entrepreneurs, who are responsive to societal needs. The intervention allows farmers to purchase training and advice from recognised service providers or knowledge institutions that meet quality criteria. Farmers have the freedom to choose which training or advisory services they want, and pay the cost directly to the service provider, with the possibility of receiving support for part of the cost. Flexibility and customisation are emphasised in this intervention. It is expected that most farmers interested in agroforestry would consult the Agroforestry consortium, e.g. ILVO (see above).

The Czech Ministry of Agriculture provides information and support to all beneficiaries free of charge (website, printed materials, webinars, telephone consultations). Regarding the design of agroforestry systems, farmers have the option of sending a draft project proposal to the Ministry when applying for the measure, to confirm whether the project is eligible. Moreover, the Czech agroforestry association provides advice to farmers. A list of recommended trees for agroforestry systems is available, which was jointly prepared by the Ministry for Agriculture and Ministry for Environment including almost 50 species of forestry trees, and 17 species of fruit trees. The list also promotes selected species of oak trees to support the adaptation to climatic changes and tackle the problems with dry periods.

Silvo-arable agroforestry system in Moravia (Czechia), (Antonin Martinik)

In Spain and France, regional structures play an important role in the advisory system. In France, flexibility in terms of implementing the advisory system is given to the regional authorities. Advisors are selected based on their competencies and skills. They are expected to act as multipliers to explain the benefits of agroforestry and landscape features to farmers (see section 4.2). In France, no national lists for recommended species exist, as importance is given to regional adaptation. In the rural areas of Spain, the best way to connect to local farmers and provide advice is via the regional and local authorities and established structures (oficinas comarcales).

4.2. Other programmes to support the maintenance, restoration or establishment of agroforestry

Some countries support agroforestry with other programmes and measures beyond the CAP. Some national energy and climate plans (NECP) based on Regulation (EU) 2018/1999 on the governance of the energy union and climate action [86] include interventions or measures for agroforestry systems. Belgium, Greece, France, Italy and Spain mention agroforestry as practices to increase carbon sequestration in their NECPs. Italy established a public register of voluntary carbon credits for the agroforestry sector managed by CREA.

France follows a pathway to decarbonise the economy by 2050 with its National Low Carbon Strategy (SNBC) [87] and to preserve biodiversity. The SNBC sets out strategic guidelines for the agricultural sector, including sustainable management and enhancement of hedgerows and development of agroforestry as well as sustainably developing the storage potential of hedges and intra-parcel agroforestry. Support for the management of agroforestry systems in France can take the form of public financial schemes, state aid, or funding from local authorities. Specific programmes are often deployed to encourage and finance the maintenance and sustainable management of agroforestry systems, through planting support and advice and support of certification and training for sustainable maintenance. More recently, initiatives such as the recovery plan in 2021, and the "Hedge Pact" in 2023, have strengthened financial support and incentives for the sustainable maintenance of agroforestry systems.

Box 7: The French Hedge Pact

Taking into account territorial differences and specificities, the Hedge Pact aims to create a general national framework that can be adapted to the needs of each region in France. The pact builds on past activities and initiatives, such as the agroforestry development plan and recovery plan. The Pact targets all hedgerows and agroforestry types, both agricultural and non-agricultural, and encompasses all stakeholders, from nursery growers to landowners and farmers, including advisory bodies. With a budget of €10 million for 2024, it is part of France's ecological planning for 2030, promising a long-term commitment from the State to mobilise all stakeholders. It comprises 25 actions. Its aim is to support the restoration or the planting of hedgerows, increase their economic viability, and incentivise their development; develop knowledge on agroforestry, provide advice and raise awareness of their sustainable management; and streamline industries and public demand that integrate sustainable hedgerow wood. One of the objectives of the Pact is to simplify regulatory approaches and provide more clarity on the applicable legal requirements: currently, different rules apply for any maintenance or removal of hedges, as hedgerows can be protected under the CAP, the regulations governing protected species, habitats and sites, the preservation of water quality, or the rules governing the protection of town planning, landscapes and heritage. This makes it difficult for farmers to understand and comply with the different requirements and reinforces the restrictive image of hedgerows. In addition, the Pact aims to incentivise farmers to plant and maintain hedgerows all over France. Despite a current negative trend of decline of hedgerows, the ambitious goal of the pact is to plant more than 50,000km of hedgerows by 2030. The aim is that this should be achieved not only through the provision of financial support, but also by improved education, especially in the specialised high agricultural schools.

Source: Interviews and Hedge Pact [88]

[86] See: https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en.

[87] See: https://www.ecologie.gouv.fr/strategie-nationale-bas-carbone-snbc.

[88] See : https://agriculture.gouv.fr/pacte-en-faveur-de-la-haie.

5. Concluding remarks

The present analysis demonstrates the diverse approaches taken to supporting agroforestry by the six Member States subject to this report. In some cases, the support for agroforestry was instigated via bottom-up initiatives (e.g. Flanders or Czechia), while in other countries the ministries or Managing Authorities were the driving forces (e.g. France).

There is a wide range of possible measures to support agroforestry systems, and while most Member States use a combination of different interventions (e.g. support for both the establishment and maintenance of agroforestry systems), they do not tend to use the full range of options available in the toolbox, including cooperation or advice.

The literature review confirms the numerous benefits of agroforestry, both for the environment and climate as well as economic benefits. However, despite this, the availability of support for agroforestry remains limited, and even where it is available, the scale of implementation and uptake is low. Knowledge exchange and awareness-raising have been highlighted as being key to supporting farmers in their decision-making. Limited knowledge about the benefits of these types of systems, a lack of clarity or certainty regarding recently changed regulatory requirements, uncertainty regarding economic viability, and the need for long-term commitments in connection with uncertainty regarding land use and ownership are among the key barriers making farmers reluctant to commit to installing new agroforestry systems. To help promote greater uptake of these systems Member States need to focus on the establishment of advisory services that promote agroforestry systems and increase stakeholders' awareness and knowledge about them in order to enhance their role as part of a sustainable agri-food-system. Capacity building addressing different stakeholders, including farmers but also staff working in Ministries responsible for the planning of agroforestry interventions, is crucial to ensure the effective design and implementation of schemes and their uptake.

Finally, transnational projects and initiatives (see Annex 1) can play a vital role in creating and disseminating knowledge and innovative practices across Member States. These should continue to be encouraged so that the benefits of agroforestry can be shared and understood more widely to foster the greater use of agroforestry practices across the EU.

6. Annexes

Annex 1 – overview of selected transnational projects and initiatives working on agroforestry

Annex 2 – lists websites, publications and key players of relevance per country

Annex 3 – CAP interventions directly linked to agroforestry

Annex 1

Below is a list of transnational projects and initiatives supporting agroforestry. Note: this is not an exhaustive list, but a selection based on Member States subject to this report, timeframe and topics addressed. There are other relevant projects implemented across Europe.

Table A.1: Selection of transnational projects and initiatives

AF4EU - Agroforestry business model innovation network

Description

The overarching objective of the AF4EU project is to promote European agroforestry through the development of a multi-actor interactive and innovation-driven agroforestry network. This builds on the sharing of successful practical experiences and existing research knowledge (applied to new territories, climates and agricultural sectors) through ICT tools, with a special focus on the development and implementation of new cost-effective practices, business models, and agroforestry-extension services covering the whole food chain.

A set of 33 successful agroforestry farm business models across Europe are analysed from a sustainability perspective, considering economic, environmental and social aspects. The project builds on previous Horizon projects, and aims to develop an agroforestry knowledge platform that integrates: (i) a searchable knowledge reservoir (the Knowledge cloud), (ii) a live handbook, (iii) an agroforestry innovation business decision support tool, and (iv) a Multilingual Massive Open Online Course (MOOC) with training modules targeting farmers and advisors.

Links

Cordis: https://cordis.europa.eu/project/id/101086563

Website : https://af4eu.eu/

Carbon Farming inventory https://carbonfarminginventory.ieep.eu/projects/af4eu-agroforestry-business-model-innovation-network/

Additional info

Total cost: € 2 996 460,00

EU contribution: € 2 996 460,00

Start date: 1 January 2023

End date: 31 December 2025

Coordinated by UNIVERSIDAD DE SANTIAGO DE COMPOSTELA, Spain

Contact page: https://af4eu.eu/contact

Contact: af4eu@usc.es

Tel: +34 982 823 144

AGFOSY

Description

The AGFOSY project is a transnational project made up of 7 partners from 6 European countries. The main reason for implementing this project transnationally is because agroforestry could help to achieve the goals of the EU CAP. The project is mainly focused on continental North and Central Europe, and explores new systems that can solve the specific East-European heritage of collectivization – large fields, landscapes without trees etc. It contributes to the exchange of good practices among the different agroforestry systems in different countries.

The main goal of the project is to develop a complex but simultaneously flexible training system for agroforestry, based on the collection of a number of case studies and good agroforestry practices from several countries. Other farmers and agricultural workers can be inspired and learn new practical techniques of planting trees on farmland through those practical examples. This system should provide farmers with knowledge and skills that assist them in implementing various agroforestry systems. The primary target group of the project are farmers and agricultural workers who want to complete their education and gain new knowledge and skills focused on agroforestry systems and their practical implementation on farms.

Links

Website: https://www.agroforestrysystems.eu/en/

Additional info

Coordinated by Association of Private Farming of the Czech Republic, the Czech Republic

Contact: martina.belasova@asz.cz

AgroForAdapt: Agroforestry systems for climate change adaptation of Mediterranean agricultural and forest areas

Description

In Europe, the Mediterranean region is particularly vulnerable to the impacts of climate change, due to increasing temperatures, irregular precipitation, and the increasing frequency and intensity of extreme weather events (droughts, heat waves, and storms). Therefore, it is essential to increase the resilience of Mediterranean ecosystems facing these threats and their related impacts, such as forest fires. So far, most of the studies related to silvo-arable systems (woody vegetation combined with crops) have been developed in France, Germany, Italy and the United Kingdom. Regarding silvo-pastoral systems (woody vegetation combined with livestock grazing), most studies until now have focused on the pasturelands of the Western Iberian Peninsula. Outside these areas, the uptake of agroforestry practices is still much lower than its potential.

The main objective of the LIFE project AgroForAdapt is to promote agroforestry systems for climate change adaptation of the agrarian and forestry sectors in the Mediterranean. The aim is to implement agroforestry systems in areas where they are still generally unknown, such as in Catalonia and Castile-Leon, Spain. Work is focused on two types of agroforestry systems: silvo-arable and silvo-pastoral.

The project is aligned with EU climate policies, especially those explicitly promoting agroforestry systems as a tool: the Biodiversity Strategy 2030, the European Green Deal, and the LULUCF Regulation. The new CAP 2021-2027 is also in line with this use of agroforestry systems. Furthermore, the project boosts regulatory and policy changes to better exploit the potential of agroforestry systems as an adaptation measure.

Expected results:

- Establishment of 23 demonstrative silvo-arable systems (164.5 ha), improved management through climate change adaptation criteria in 16 additional ones (126.3 ha), and promotion of their replication in 300 ha in the medium term;
- Establishment of 11 demonstrative low-density silvo-pastoral systems (176 ha), promoting their further replication in 275 ha;
- Establishment of demonstrative silvo-pastoral systems to reduce fire vulnerability in 12 forests (335 ha), promoting their further replication in 800 ha;
- An assessment of the performance of these demonstrative agroforestry systems, compared to conventional agriculture, grazing and forestry in terms of yield, profitability, carbon fixation, forest structure and composition, pasture diversity, vulnerability to forest fires, tree vitality, extreme temperatures buffering, air humidity, soil moisture, light availability, water balance, and biodiversity;
- Promotion of changes in regulations, policies and adaptation plans to facilitate agroforestry in Catalonia, Girona province, Barcelona Metropolitan Area, and Occitanie/Provence-Alpes-Côte d'Azur.

*Description from the LIFE public database

Links

LIFE Project Database: https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE20-CCA-ES-001682/agroforestry-systems-for-climate-change-adaptation-of-mediterranean-agricultural-and-forest-areas#:~:text=The%20main%20objective%20of%20the,and%20Castile%2DLeon%2C%20Spain

Website: https://agroforadapt.eu/en/home-eng/

Additional info

Total Eligible Budget: 3 024 537 €

EU Contribution: 1 663 495 €

Start Date: 01/10/2021

End Date: 30/09/2026

Coordinating Beneficiary: Consorci Centre de Ciència i Tecnologia Forestal de Catalunya, Spain

Contact page: https://agroforadapt.eu/en/contact/

AGROMIX: AGROforestry and MIXed farming systems - Participatory research to drive the transition to a resilient and efficient land use in Europe

Description

Europe is one of the most intensively 'used' continents on the globe. As much as 80% of its land is used for settlement and production systems, particularly in agriculture and forestry. The EU-funded AGROMIX project aims to conduct participatory research to drive the transition towards resilient and efficient land use in Europe. It focuses on practical agroecological solutions for farm and land management and related value chains. Furthermore, it makes use of a network of 83 sites that encompass mixed farming, agroforestry or value chain stakeholder systems, which are used to measure, design, model, test and improve these solutions.

*Description from the CORDIS website

Links

Cordis: https://cordis.europa.eu/project/id/862993

Website : https://agromixproject.eu/

Additional info

Total cost: € 6 999 256,01

EU contribution: € 6 999 254,99

Start date: 1 November 2020

End date: 31 October 2024

Coordinated by COVENTRY UNIVERSITY, United Kingdom

Contact page: https://agromixproject.eu/contact/

DIGITAF – DIGItal Tools to help AgroForestry meet climate, biodiversity and farming sustainability goals: linking field and cloud

Description

DigitAF aims to boost the roll-out of agroforestry-based practices through the co-development of digital tools tailored to the needs and concerns of DigitAF target groups. Key objectives of the project include:

- Supporting policy actors at regional, national and European level in designing efficient and effective policies to support agroforestry adoption and monitor their impact on biodiversity, climate change mitigation and agricultural sustainability;
- Supporting farmers in designing and managing agroforestry systems in order to optimize agronomic, economic, social and environmental performance;
- Enabling actors in agroforestry value chains to verify and market benefits, including enhanced biodiversity, carbon sequestration, and soil health;
- Overcoming socio-technical barriers to a widespread implementation of agroforestry by setting up six living labs in Italy, Germany, the Netherlands, the United Kingdom, Finland and the Czech Republic;
- Providing researchers and software developers with FAIR (findable, accessible, interoperable and reusable) open platforms in order to encourage data sharing and software interoperability and foster open science practices;
- Convincing decision-makers that agroforestry is a concrete solution to improve agricultural sustainability and resilience to climate change. Open-source tools will be co-developed based on the existing practical knowledge, scientific evidence and models, tested with the end-users at living lab locations, and improved based on their feedback. The DigitAF consortium and living labs partners span all agroforestry value chain actors, thus facilitating a broader dissemination of project results and outputs.

Links

Cordis: https://cordis.europa.eu/project/id/101059794

Website: https://digitaf.eu/

Carbon Farming inventory : https://carbonfarminginventory.ieep.eu/projects/digitaf-digital-tools-to-help-agroforestry-meet-climate-biodiversity-and-farming-sustainability-goals-linking-field-and-cloud/

Additional info

Total cost: € 3 679 061,25

EU contribution: € 3 667 138,25

Start date: 1 July 2022

End date: 30 June 2026

INSTITUT NATIONAL DE RECHERCHE POUR L'AGRICULTURE, L'ALIMENTATION ET L'ENVIRONNEMENT,

France

Contact: contact@digitaf.eu

MIXED: Multi-actor and transdisciplinary development of efficient and resilient MIXED farming and agroforestry-systems

Description

Agriculture is a big source of greenhouse gas emissions in Europe. The EU is committed to methods that increase efficiency and resilience to climate change and reduce emissions. European Mixed Farming and Agroforestry Systems (MiFAS) optimise productivity and resource use. The EU-funded MIXED project takes a participatory and transdisciplinary approach to advance and apply efficient and resilient MiFAS. Specifically, this approach will engage organic and conventional networks of farmers, researchers, and other stakeholders to ensure the highest levels of implementation of MiFAS in terms of climate change and ecosystems services. It also addresses the potential effects on the environment and crop and livestock production, as well as on animal welfare.

*Description from the CORDIS website

Links

Cordis: https://cordis.europa.eu/project/id/862357

Website: https://projects.au.dk/mixed//

Additional info

Total cost: € 6 999 508,75

EU contribution: € 6 999 508,75

Start date: 1 October 2020

End date: 28 February 2025

Coordinated by AARHUS UNIVERSITET, Denmark

Contact: asn@agro.au.dk or

tommy.dalgaard@agro.au.dk

REFOREST – Agroforestry at the forefront of farming sustainability in multifunctional landscapes in Europe

Description

The ReForest project aims to overcome the barriers to broader agroforestry adoption in Europe. It encourages knowledge exchange amongst stakeholders, proposes solutions to farmers, and suggests relevant policy interventions to leverage the potential of agroforestry as a technique able to improve farm productivity, socioeconomic viability and sustainability.

Agroforestry has many advantages and additional benefits compared to standard monocultures, whether arable or pastoral. Several known factors currently slow its adoption by farmers. ReForest targets these barriers to make agroforestry one of the most attractive food production systems in Europe. Since farming income represents farmers' livelihood, capturing the wider environmental benefits of agroforestry within the farm business model is one of the project's key objectives.

The project adopts a co-creation and multi-actor approach, and maximises existing knowledge and data, including expanding agroforestry living labs using foundations laid by previous projects. The project prioritises knowledge exchange and transfer, the integration of carbon and biodiversity finance into farm business models, and proposing targeted specialist business models taking advantage of agroforestry systems.

ReForest marries farmer knowledge bases and practical experience of establishing and managing agroforestry systems with the latest process-based and statistical models describing the performance of these systems. One of the outputs of the project is a multi-lingual knowledge base guiding practitioners with the ability to predict their productivity and link them to relevant public and private funding streams.

Links

Cordis: https://cordis.europa.eu/project/id/101060635

Website: https://agroreforest.eu/

Carbon Farming inventory: https://carbonfarminginventory.ieep.eu/projects/reforest-agroforestry-at-the-forefront-of-farming-sustainability-in-multifunctional-landscapes-in-europe/

Additional info

Total cost: € 3 333 691,25

EU contribution: € 3 333 691,00

Start date: 1 July 2022

End date: 30 June 2026

Coordinated by CESKA ZEMEDELSKA UNIVERZITA V PRAZE, Czechia

Contact page: https://agroreforest.eu/contact-us/

Annex 2

Below is a list of contacts relevant to agroforestry in the selected countries, including relevant organisations, projects and some publications.

Table A.2: Overview of relevant contacts and initiatives for agroforestry

Member State	Further resources, good practices, contacts
BE-FL	Agroforestry Flanders: https://www.agroforestryvlaanderen.be/nl/ Information on planting payments: Aanplantsubsidie voor boslandbouwsystemen (agroforestry) | Landbouw en Zeevisserij https://lv.vlaanderen.be/subsidies/perceel-en-dier/plant/aanplantsubsidie-voor-boslandbouwsystemen-agroforestry Information on maintenance payments: Onderhoud van boslandbouwsystemen (agroforestry) | Landbouw en Zeevisserij (vlaanderen.be) https://lv.vlaanderen.be/steun/perceelsgebonden-steun/perceelsgebonden-ecoregelingen-en-agromilieuklimaatmaatregelen-16 CAP Strategic Plan: https://www.ecologic.eu/19048 Research project business model ILVO (AGROFORESTRY 2025): Agroforestry 2025 - Agroforestry (agroforestryvlaanderen.be) https://www.agroforestryvlaanderen.be/nl/projecten/agroforestry-2025 Onderzoeks projecten - Agroforestry (agroforestryvlaanderen.be) – all projects of consortium https://www.agroforestryvlaanderen.be/nl/projecten There is an online course on agroforestry available (only in Dutch).
CZ	Czech Association for agroforestry (CSAL): Český spolek pro agrolesnictví (agrolesnictvi.cz - https://agrolesnictvi.cz/): NGO helping to inform the public about the possibilities and news in agroforestry and to provide information to farmers about this way of farming. This Organisation also participates in various national and international projects dedicated to research, popularization and implementation of agroforestry in practice. CSAL is also the Czech branch of the European Agroforestry Federation (EURAF). Czech University of Life Sciences Prague (czu.cz - https://www.czu.cz/en), Faculty of Tropical AgriSciences. Mendel University in Brno MENDELU (mendelu.cz - https://ldf.mendelu.cz/en/), Faculty of Forestry and Wood Technology
FR	Hedge Pact (Pacte en faveur de la haie) | Ministère de l'Agriculture et de la Souveraineté alimentaire: https://agriculture.gouv.fr/pacte-en-faveur-de-la-haie Agroforestry in France (Ministère de l'Agriculture et de la Souveraineté alimentaire): https://agriculture.gouv.fr/lagroforesterie-en-france Agroforestry Network Afac-Agroforesteries - Le réseau des professionnels de l'arbre hors-forêt https://afac-agroforesteries.fr/
EL	Greek agroforestry network: http://www.agroforestry.gr/pages/gr/the-agroforestry-systems/ Forestry and Natural Environment, Aristotle University of Thessaloniki, Thessaloniki, Greece: https://www.for.auth.gr/en
IT	Agroforestry Network Tuscany: https://gonewton.it/ Agroforestry reterurale.it: https://www.reterurale.it/agroforestry

ES	Platform for Extensive Livestock Farming and Pastoralism: https://www.ganaderiaextensiva.org/ Research Institute on dehesa: https://indehesa.unex.es/index.php/2020/11/06/proyecto-mosaico-ejemplo-accion-participativa/ Spanish Federation for dehesa: https://fedehesa.org/ovinnova/ LIFE project on dehesa: https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE11-BIO-ES-000726/dehesa-ecosystemsdevelopment-of-policies-and-tools-for-biodiversity-conservation-and-management: The bioDEHESA project aimed to promote sustainable, integrated management of dehesas by demonstrating and disseminating action plans, which deal with the main challenges involved in their conservation, and by creating a network of 40 pilots. Operational Group GoDehesa: https://godehesa.org/: Implementation of a planning and decision-making system for the improvement of land management based on obtaining environmental, economic and social benefits. Operational Group CASTANEA: https://gocastanea.eu/: Promote the revaluation of chestnut groves in Extremadura, improving farm management and the phytosanitary status of chestnut trees in the region. The recovery and maintenance of the traditional surface area will help to improve the competitiveness of chestnut tree farms, given their importance in family economies in the mountains and the fact that they are also a natural habitat of community interest. Mosaico project: https://euraf.isa.utl.pt/news/MOSAICO_project Video Ganadería extensive y su medio natural: https://www.youtube.com/watch?v=6nZpj9wvl18 Further literature: The pastures of Spain: https://www.researchgate.net/publication/317007469_The_pastures_of_Spain Libro verde de la Dehesa y el Montado: https://www.pfcyl.es/sites/default/files/biblioteca/documentos/LIBRO_VERDE_DEHESA_version_20_05_2010.pdf La conservación de la dehesa y las intervenciones de desarrollo rural en el PEPAC 2023-2027: https://www.mapa.gob.es/ca/pac/pac-2023-2027/la-conservacion-de-la-dehesa-y-las-intervenciones-de-desarrollo-rural_tcm34-626885.pdf Ayudas al intercambio de conocimientos y actividades de formación e información : https://www.mapa.gob.es/es/desarrollo-rural/temas/innovacion-medio-rural/ayudas-conocimiento-actividades/default.aspx Ayudas para servicios de asesoramiento en digitalización : https://www.mapa.gob.es/es/desarrollo-rural/temas/innovacion-medio-rural/ayudas-asesoramiento-digitalizacion/default.aspx San Miguel A (2005). Mediterranean European silvo-pastoral systems. In: Mosquera-Losada MR, McAdam J, Rigueiro-Rodríguez A (eds.) Silvo-pastoralism and sustainable land management. CAB International, Wallingford, UK. https://www2.montes.upm.es/dptos/dsrn/sanmiguel/Publicaciones.html
EU	European Agroforestry Federation: https://euraf.net/

Annex 3

Table A.3: CAP interventions directly linked to agroforestry[89]

MS[90]	Macro-type	Type of Intervention	National Code	Intervention Name - English	Specific Objective	Result Indicator	Output Indicator	Total EU expenditure (2023-2029)	Total Public expenditure (2023-2029)
BE-FL	Rural Development	ENVCLIM	3.7	Maintenance of agroforestry systems	SO4, SO5, SO6	R.12, R.14, R.19, R.21, R.31, R.33	O.16	120 976	281 340
CZ	Rural Development	ENVCLIM	26.70	Caring for an established agroforestry system	SO4, SO5, SO6	R.12, R.14, R.19, R.22, R.23, R.31, R.34	O.16	475 020	1 357 200
CZ	Rural Development	INVEST	42.73	Setting up an agroforestry system	SO4	R.17, R.26	O.21	1 371 195	3 917 700
DE	Direct Payment - Decoupled	Eco-scheme	DZ-0403	Maintaining agroforestry practices on arable land and permanent grassland	SO4, SO5, SO6	R.4, R.6, R.7, R.12, R.14, R.19, R.21, R.22, R.23, R.31, R.34	O.8	9 500 000	9 500 000
EL	Direct Payment - Decoupled	Eco-scheme	ΤΠ1-31.5	Improvement of agroforestry ecosystems rich in landscape elements	SO4, SO5, SO6	R.14, R.17, R.19, R.31, R.33, R.34	O.8	66 564 568	66 564 568
ES	Rural Development	ENVCLIM	6502.2	Commitments to maintain afforestation and agroforestry systems (6502.2 IACS)	SO4, SO5, SO6	R.30, R.33	O.16	17 605 253	27 069 248

[89] Source: CAP catalogue of interventions.

[90] MS in bold = chosen for this report.

MS[91]	Macro-type	Type of Intervention	National Code	Intervention Name - English	Specific Objective	Result Indicator	Output Indicator	Total EU expenditure (2023-2029)	Total Public expenditure (2023-2029)
ES	Rural Development	INVEST	6881.1	Non-productive forest investments in afforestation and agroforestry systems	SO4, SO5, SO6	R.17, R.18, R.27	O.23	45 717 884	68 809 809
IT	Rural Development	ENVCLIM	SRA28	Support for maintaining afforestation/afforestation and agroforestry systems	SO4, SO5, SO6	R.17	O.16	31 407 497	66 080 718
IT	Rural Development	INVEST	SRD05	Planting of afforestation/creation of woodland and agroforestry systems on agricultural land	SO1, SO4, SO6	R.17, R.18, R.27, R.32	O.23	21 775 430	47 387 981
PL	Rural Development	ENVCLIM	I 8.8	Afforestation and woodland premiums and agroforestry systems	SO4, SO5, SO6	R.12, R.14, R.19, R.21, R.22, R.30, R.31, R.34	O.15	6 433 882	8 042 352
PL	Rural Development	INVEST	I 10.13.	Establishment of agroforestry systems	SO4, SO5, SO6	R.16, R.17, R.26, R.32	O.21	4 799 028	5 998 785
PT	Rural Development	INVEST	C.3.2.2	Installation of agroforestry systems	SO4, SO5, SO6, SO8	R.17, R.18, R.27	O.24	2 791 841	3 360 000
PT	Rural Development	INVEST	F.2.2	Investment in the Creation and Regeneration of Agroforestry Systems	SO4, SO5, SO6	R.17, R.18, R.27	O.23	255 000	300 000
SK	Rural Development	ENVCLIM	70.01	Conservation and maintenance of plants under established agroforestry system	SO4	R.17	O.16	1 858 105	2 932 150
SK	Rural Development	INVEST	73.01	Establishment of an agroforestry system	SO4	R.16, R.17, R.26	O.21	2 116 115	3 339 300

[91] See footnote 90.

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