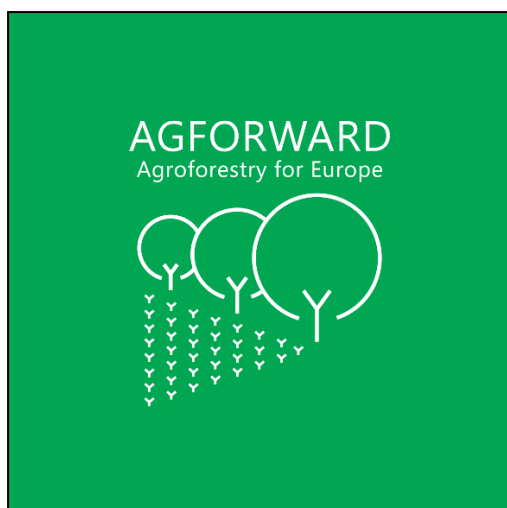




How can policy support the uptake of agroforestry in Europe?

Project name	AGFORWARD (613520)
Work-package	8: Agroforestry Policy Development
Deliverable	Deliverable 8.24: How can policy support the appropriate development and uptake of agroforestry in Europe?
Date of report	7 September 2017
Authors	María Rosa Mosquera-Losada, Jose Javier Santiago Freijanes, Andrea Pisanelli, Mercedes Rois, Jo Smith, Michael den Herder, Gerardo Moreno, Norbert Lamersdorf, Nuria Ferreiro Domínguez, Fabien Balaguer, Anastasia Pantera, Vasilios Papanastasis, Antonio Rigueiro-Rodríguez, Jose Antonio Aldrey, Pilar Gonzalez-Hernández, Juan Luis Fernández-Lorenzo, Rosa Romero-Franco, Nic Lampkin, Paul J Burgess
Contact	mrosa.mosquera.losada@usc.es
Reviewed	Paul J Burgess (7 September 2017)

Contents

1	Context and structure	2
2	Agroforestry in the global policy framework	3
3	Agroforestry: policy definition and practices	4
4	Agroforestry and cross-compliance	8
5	Agroforestry on agricultural land and Pillar I	9
6	Rural development to foster agroforestry (Pillar II)	14
7	Conclusions	19
8	Acknowledgements	20
9	References	20



AGFORWARD (Grant Agreement N° 613520) is co-funded by the European Commission, Directorate General for Research and Innovation, within the 7th Framework Programme of RTD. The views and opinions expressed in this report are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission.

1 Context and structure

1.1 Context

The AGFORWARD research project (January 2014-December 2017), funded by the European Commission, is promoting agroforestry practices in Europe that will advance sustainable rural development. The project has four objectives:

1. to understand the context and extent of agroforestry in Europe,
2. to identify, develop and field-test innovations (through participatory research) to improve the benefits and viability of agroforestry systems in Europe,
3. to evaluate innovative agroforestry designs and practices at a field-, farm- and landscape scale, and
4. to promote the wider adoption of appropriate agroforestry systems in Europe through policy development and dissemination.

The fourth objective of the project is co-ordinated through policy and dissemination work-packages. The first AGFORWARD policy report described the support for agroforestry within the EU for the periods 2007-2013 and 2014-2020 (Mosquera-Losada et al. 2016) and is the basis to understand the present document. This first report provided a definition of agroforestry, a policy classification for agroforestry practices, and an analysis of the regional distribution of agroforestry practices in Europe. The report also explained the international policy framework for European policy and demonstrated how agroforestry can support global and European policies to promote sustainable agriculture and rural development. This includes the role of agroforestry to reduce and counteract greenhouse gas emissions (e.g. climate-smart agriculture) and improve biodiversity, among other ecosystem services. The last two sections of that report explained how Pillar I and Pillar II of the EU Common Agricultural Policy (CAP) affects the implementation of agroforestry (Mosquera-Losada et al. 2016).

1.2 Objectives

The objective of this report is to provide guidance to policy makers in the European Union on how modifications to policy can increase the appropriate development and uptake of agroforestry in Europe considering current CAP structure but also the Post-2020 CAP.

1.3 Structure of this report

This report comprises seven sections. After this section which describes the context and structure (Section 1), Section 2 highlights how agroforestry can effectively support a number of high-level societal goals (e.g. increased biodiversity and carbon storage, improved water quality, and high value agricultural products) as identified by the European Commission. Section 3 defines agroforestry and the major types or practices of agroforestry in Europe that should be fostered by the CAP. Section 4 focuses on cross-compliance while Section 5 describes agroforestry in Pillar I of the Common Agricultural Policy with an interaction of cross-compliance, direct payments and greening payments. Section 6 focuses on Pillar II measures related to agroforestry on agricultural land and on forest land taking into account the promotion of Rural Development in a general context. Section 7 provides final conclusions. As the Post-2020 CAP is currently under discussion, this report was written considering the fulfilment of all requisites of farmers to be paid (e.g. active farmer and entitlement ownership) and integrating two different perspectives: i) improvements of the current CAP 2014-2020 in Pillar I and Pillar II and their interconnections (Improving CAP 2014-2020), and ii) post 2020 improvements.

2 Agroforestry in the global policy framework

Agroforestry in the EU takes place in the context of the Common Agricultural Policy (CAP). The current CAP is monitored in relation to three objectives: *“a) viable food production, with a focus on agricultural income, agricultural productivity and price stability; b) sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water, and c) balanced territorial development, with a focus on rural employment, growth and poverty in rural areas”* (Regulation 1306/2013).

The CAP occurs in the context of global strategic policies such as those described by United Nations and FAO and those that are provided at Pan European and European levels (Mosquera-Losada et al. 2016). Some of the key drivers affecting the CAP, as highlighted by the European Commission, are the UN Sustainable Development Goals (SDGs) and the Cork 2.0 Declaration. The SDGs are a collation of 17 goals which encompass environmental, social and economic aspects of human well-being (United Nations, 2015). At the Meeting on “Sustainability Challenges delivering the 2030 Agenda” on 20 December 2016, Hans Bruyninckx (2016) from the European Environment Agency explained that three priorities of the Seventh European Action Programme (EAP) correspond with the sustainable development goals. The need to *“protect, conserve and enhance the Union’s natural capital”* relates to SDG 6 (Clean water and sanitation), 14 (Life below water), and 15 (Life on land). The second priority to develop *“a resource-efficient, green and competitive low-carbon economy”* relates to SDGs 7 (affordable and clean energy), 8 (decent work and economic growth), 9 (industry, innovation and infrastructure), 11 (sustainable cities and communities), 12 (responsible consumption and production) and 13 (climate action). The third priority to *“safeguard the Union’s citizens from environment-related pressures and risks to health and well-being”* relates to SDGs 2 (Zero hunger), and 3 (good health and well-being). A brief set of evidences of how agroforestry can support these selected development goals is provided in Table 1.

Table 1. Agroforestry can help support the Sustainable Development Goals

Sustainable development goals	Evidence that agroforestry can support
2. Zero hunger	Increasing food production whilst enhancing the environment
3. Good health and well being	Improved quality of drinking water and healthier food
6. Clean water and sanitation	Improved water quality due to tree uptake of pollutants
7. Affordable and clean energy	Woody vegetation in the farmed landscape for bioenergy
8. Decent work and economic growth	Opportunities for added value
11. Sustainable cities and communities	Through the promotion of fruit trees in homegardens
12. Responsible consumption and production	Sustainable production systems
13. Climate action	Enhanced carbon storage on farm land
15. Life on land	Enhanced biodiversity

Moreover, agroforestry can help to address a large number of European level initiatives including the Pan-European Biodiversity and Landscape Strategy (PEBLDS), the European Convention on Landscapes, and the European Climate Change Programme (ECCP) as described by Mosquera-Losada et al. (2016). The Cork 2.0 Declaration was launched in September 2016 and established by different policy actors included the European Agroforestry Federation (EURAF) and all types of farmers dealing with agricultural and forestry lands. The key Cork 2.0 outputs, where agroforestry can play a role,

include the need to develop sustainable agriculture in the EU, recognition of traditional heritage agricultural systems, the inclusion of forestry within the EU agricultural policy, enhancing ecosystem services from agriculture, reducing the impact of climate change through mitigation and adaptation and highlighted the importance of the extension of integrated systems (Cork Declaration 2016).

Whilst agroforestry can effectively contribute to a number of high-level environmental and societal goals (e.g. increased biodiversity and carbon storage, improved water quality, and high value agricultural products), the value of some of these benefits is not fully perceived by markets and some current policies constrain agroforestry. Thus there is a need for government to remove detrimental policies and support initiatives that are beneficial. The initial stakeholder studies in AGFORWARD identified that a key constraint in agroforestry uptake is the complexity of the associated administration (Burgess et al. 2016; García de Jalón et al. 2017). Therefore policies related to agroforestry should simplify administration for farmers whilst encouraging productive, environmentally and socially beneficial agricultural and forestry systems.

Premise: Agroforestry should be strongly supported by the CAP because it is a sustainable land management option that delivers market and non-market goods and services that address UN Global societal goals. Governments need to develop policies and actions that foster agroforestry within an EU policy framework.

3 Agroforestry: policy definition and practices

3.1 Definition

Agroforestry is not always fully understood as it integrates many concepts at the same time. However building on scientific and international work, it is possible to develop a definition of agroforestry from a policy point of view.

Policy bodies such as FAO (2015) define agroforestry as *“a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals”*. Within the AGFORWARD project we used the definition that agroforestry is *“the practice of deliberately integrating woody vegetation (trees or shrubs) with crop and/or animal systems to benefit from the resulting ecological and economic interactions”* (Burgess et al. 2015). In Mosquera-Losada et al. (2016), the following definition (with some minor changes) was proposed: agroforestry is *“the deliberate integration of woody vegetation in at least two vertical layers on land, with the bottom layer providing an agricultural product such as crops or forage/pasture which is consumed by animals”*. For the European Union, a list of agricultural products including forage, annual and perennial crops is provided by Annex 1 of the EU Directive 1308/2013 CAP. The European Agroforestry Federation (EURAF 2016) defines agroforestry as *“the integration of woody vegetation, crops and/or livestock in the same area of land. Woody vegetation can be inside parcels or on the boundaries (hedges)”*. Each of these definitions includes “woody perennials” as also identified by the agroforestry policy strategies of USA (USDA 2011), AFTA (2016) and India (Government of India 2014) and in the development of the Measure 8.2 of the current CAP. This allows the inclusion of systems such as hedgerows (e.g. bocage in France) and the combined grazing of shrubs, trees and grass as a mechanism to adapt farming systems to shortage periods and climate change.

Woody perennials are also considered by the European Commission in the sub-measure fiche (EU 2014) describing Measure 8.2 (as a deployment of the Regulation 1305/2013) on the establishment of agroforestry, where agroforestry on agricultural land is defined as *“land-use systems and practices where woody perennials are deliberately integrated with crops and/or animals on the same parcel of land management unit without the intention to establish a remaining forest stand. The trees may be arranged as single stems, in rows or in groups, while grazing may also take place inside parcels (silvoarable agroforestry, silvopastoralism, grazed or intercropped orchards) or on the limits between parcels (hedges, tree lines)”*.

Moreover, whilst this definition adequately describes agroforestry for agricultural lands, being perfect for that, in this report, two additional qualifications to the above definition are proposed. Firstly agroforestry can occur on agricultural and forest land. Secondly it can be useful to clarify that the crop component does not relate to a single overstorey tree species e.g. an apple orchard by itself is not agroforestry, therefore making necessary to have layers. So, a proposal for defining agroforestry is *“the deliberate integration of woody vegetation (trees and/or shrubs) as an upper storey on land with pasture (consumed by animals) or an agricultural crop in the lower storey. The woody species can be evenly or unevenly distributed or occur on the border of plots. The woody species can deliver forestry or agricultural products and other ecosystem services (i.e. provisioning, regulating or cultural)”*.

The above definition should be complemented with a consideration of the scales at which agroforestry operates. Much Pillar I CAP regulation takes place at a plot level, but Pillar II can be implemented at farm level. Agroforestry can contribute to landscape- and catchment-level goals such as the improvement of biodiversity and water quality. In some situations, it can be useful to distinguish between agroforestry at a plot, farm and landscape-scale. For this report, we refer to agroforestry practices at plot level and we link agroforestry systems at farm level. We consider the definition of "farming system" given by the FAO and World Bank (2001) which is *“a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate. Depending on the scale of the analysis, a farming system can encompass a few dozen or many millions of households”*.

Recommendation 1: Defining agroforestry

A definition of agroforestry is *“the deliberate integration of woody vegetation (trees and/or shrubs) as an upper storey on land, with pasture (consumed by animals) or an agricultural crop in the lower storey. The woody species can be evenly or unevenly distributed or occur on the border of plots. The woody species can deliver forestry or agricultural products or other ecosystem services (i.e. provisioning, regulating or cultural)”*. Agroforestry can take place at a range of scales (e.g. plot, farm and landscape). At farm and landscape scale it can be implemented in systems that are able to diversify production (e.g. food, forage, timber and fuelwood), provide ecosystem services (e.g. soil restoration, water preservation, climate regulation, and biodiversity enhancement), thus increasing both resilience and profitability.

3.2 Agroforestry practices

Mosquera-Losada et al. (2016) describes five main types of agroforestry practices (Table 2). Silvopasture and silvoarable are the main subjacent practices of agroforestry. In order to facilitate agroforestry recognition and implementation, and considering their important role in biodiversity, water issues and pollination, we have extended the “riparian buffer strip” category to include any kind of hedgerows and windbreaks. The other two main practices are forest farming and homegardens. Twenty seven measures of the current Pillar II CAP are linked to these agroforestry practices, which should in the future be synthesized in a unique measure linked to different land covers (arable, permanent grassland, permanent crop, peri-urban and rural residential areas, and forestry). As explained in Recommendation 9, bringing these together in a single measure should help to simplify the CAP and the agroforestry implementation and to evaluate the policy impact on agroforestry.

Table 2. Spatial agroforestry practices in Europe

Agroforestry practice	Description	
Silvopasture		Combining woody with forage and animal production. It comprises forest or woodland grazing and pastoral land with hedgerows, copses, isolated/scattered trees or trees in lines or belts.
Silvoarable		Widely spaced woody vegetation inter-cropped with annual or perennial crops. Also known as alley cropping. Trees/shrubs can be distributed following an alley cropping, copses, isolated/scattered trees, hedges and line belts design.
Hedgerows, windbreaks and riparian buffer strips		Lines of natural or planted perennial vegetation (trees/shrubs) bordering croplands/pastures to protect livestock, crops, and/or soil and water quality. They can be combined with arable lands (silvoarable) or grasslands (silvopasture).
Forest farming		Forested areas used for production or harvest of natural standing speciality crops for medicinal, ornamental or culinary uses, including those integrating forest and agricultural lands.
Homegardens or kitchen gardens		Combining trees/shrubs with vegetable production in urban areas

The dominant type of agroforestry in the EU is silvopasture agroforestry combining woody perennials with forage and animal production (Mosquera-Losada et al. 2016; den Herder et al. 2017). A detailed description of the number of hectares and the proportion of agroforestry practices in Europe per

Rural Development Programme region can be seen in Mosquera-Losada et al. (2016). An inventory of the practices is needed in order to evaluate the impact of agroforestry policies based on successive inventories such as the LUCAS surveys. Such analyses also provide the Commission and Member States with an overview of the main areas where different agroforestry practices could be implemented. As the current area of agroforestry is estimate to be the equivalent of 8.8% of the utilised agricultural area (den Herder et al. 2017), there is substantial scope for expansion, a potential area of at least 90% in the respective land covers (arable lands, permanent pasture and permanent grasslands) (Mosquera-Losada et al. 2016).

Table 3. Agroforestry practices can be linked to dominant land use categories (agriculture, forest or peri-urban)

Land use and agroforestry practice		Examples	Brief examples and descriptions
AGRICULTURE	Silvopasture	Wood pasture and parkland	Typically areas used for forage and animal production that includes non-agricultural trees and shrubs.
		Meadow orchards	Typically areas of agricultural trees and shrubs (e.g. fruit orchards, olive groves, vineyards) which are grazed.
	Hedgerows, windbreaks and riparian buffer strips	Hedgerows, windbreaks and riparian buffer strips	Here the woody components are planted to provide shelter, shade, or parcel demarcation to a crop and/or livestock production system. Riparian buffer strips are typically created to protect water quality and can be silvopasture or silvoarable.
	Silvoarable	Alley-cropping systems	Widely spaced woody perennials inter-cropped with annual or perennial crops. As the tree canopy develops, the crops may be replaced with a grass understorey.
FOREST	Silvopasture	Forest grazing	Although the land cover is described as forest, the understorey is grazed and delivering agricultural products
	Forest farming	Forest farming	Forested areas used for production or harvest of naturally standing speciality crops for medicinal, ornamental or culinary uses
URBAN AND PERIURBAN	Homegardens	Homegardens	Combining trees/shrubs with vegetable production usually associated with peri-urban or urban areas

Land management in Europe largely takes place in the context of “agricultural land”, “forestry land”, and “other areas”. The distinction between “agricultural land” and “forest land” occurs in the Common Agricultural Policy (CAP), and in terms of carbon accounting. The UN Framework for Climate Change (UNFCCC) and the International Panel for Climate Change (IPCC) uses land use categorisations such as “forest land”, “cropland”, “grassland”, and “settlements” among others (Milne et al. 2003) as a basis for land-based accounting of carbon (Briner and Konrad 2014). For these reasons, from a policy perspective, it can be useful to link the key agroforestry practices on agricultural land, those of forest land, and those in urban and peri-urban areas as a land use within

these land designations (Table 3). Moreover, links between the use of agroforestry in the different types of land designation and between the agricultural, forestry and urban sectors are needed within the bioeconomy and circular economy framework, and to simplify agroforestry regulations within the CAP.

Recommendation 2: Agroforestry practices

The CAP should identify, recognize and foster the use of the following **five agroforestry practices** across Europe: silvopasture; silvoarable; hedgerows, windbreaks and riparian buffer strips; forest farming and homegardens. In the EU CAP context, it is useful to distinguish between “agroforestry practices on agricultural land” and “agroforestry practices on forest land”; this is also useful for considering the circular and bioeconomy framework, carbon accounting and EU directives.

4 Agroforestry and cross-compliance

Between 2014 and 2020, the CAP is being administered in two key sections: Pillar I, which is completely funded by the European Commission and Pillar II, the Rural Development Programs, which is co-funded between European Commission and the Member States. Recipients of support from either section have to fulfil cross-compliance requisites. The largest financial payments occur within Pillar I where “active farmers” who have eligible agricultural land (and are owners of payment entitlements) receive direct payments in the form of basic (e.g. as basic or single area payments) and “greening” payments.

4.1 Cross-compliance

Farmers receiving direct payments through Pillar I and environmental payments in Pillar II have to comply with 13 Statutory Management Requirements (SMR) and standards for maintaining the land in Good Agricultural and Environmental Condition (GAEC). Maintaining the SMRs and GAEC, are commonly known as cross-compliance. The SMRs have evolved over time and are associated to issues such as water, biodiversity, food and feed laws, plant health, food safety, and animal welfare. The GAEC rules in 2014-2020 (Annex 2, Regulation 1306/2013) are focused on water, soil and carbon stocks, and landscape features. GAEC condition 7 calls for *“the retention of landscape features, including where appropriate, hedges, ponds, ditches, trees in line, in group or isolated, field margins and terraces, and including a ban on cutting hedges and trees during the bird breeding and rearing season and, as an option, measures for avoiding invasive plant species”* (Annex 11 in regulation 1306/2013).

Within cross-compliance, there is clear recognition that integrating woody vegetation can make agriculture more sustainable. The promotion and protection of a woody component in agricultural lands appear in a transversal way through the cross-compliance, greening and different rural development measures (up to 27 measures protect or promote agroforestry practices across different countries), usually linked to landscape features. However, agroforestry is not recognized as such, in spite of the emphasis on woody vegetation preservation in the CAP.

4.2. Landscape features

Landscape features preservation (linked to GAEC condition 7 described above) aims to protect, amongst other features, scarce woody vegetation in some European agricultural landscapes. However the administrative difficulty for both farmers and administrators in identifying and monitoring these features has made landscape features protection difficult. Whilst identified features can be eligible for direct payments, the liability of having to maintain these features means that some farmers and member states staff are reluctant to declare their presence and others may even remove woody components from the landscape to simplify administration. This can be further exacerbated by uncertain changes from one period of the CAP to the next. The EU Court of Auditors (2009) has highlighted the lack of effectiveness of cross-compliance in regard to the protection of landscape features (associated with isolated trees, and trees and woody vegetation with different organizational frames in the landscape). Moreover, the current activities only focus on the preservation of landscape features but not in their promotion.

Recommendation 3: Agroforestry and landscape features

Woody vegetation promotion and preservation linked to landscape features policies associated with Pillar I and Pillar II payments should be simplified and objectives should be clearly stated, and the administrative burden reduced.

5 Agroforestry on agricultural land and Pillar I

5.1 Direct payment eligibility for agroforestry on agricultural land

There are three main categories of agricultural land use when determining direct payments: arable, permanent pasture or permanent grassland (including herbaceous species other than grass, also browsable shrubs and trees), and permanent crops (i.e. nurseries, multi-annual crops and short rotation coppice). As explained in Table 3 and illustrated in Table 4, the main agroforestry types on arable land include silvoarable agroforestry and the use of hedgerows, windbreaks and riparian buffer strips. Agroforestry on permanent grassland includes silvopastoral practices, such as those used in dehesa, montado, wood pasture, and hedgerows, windbreaks, and riparian buffer strips. Areas of permanent crops can be grazed (a form of silvopasture) or intercropped (a form of silvoarable agroforestry). Because direct payments related to agricultural land are substantial in the current European socioeconomic context, the successful development and implementation of “agroforestry on agricultural land” will only occur if agroforestry on agricultural land remains eligible for direct payments. Hence the key question is how should agroforestry secure direct payments and how the CAP can foster agroforestry as a sustainable land use on agricultural land in Europe?

Grazed and intercropped permanent crops areas that deliver products (as listed in the Annex 1 of 1308/2013) are eligible for Pillar I payments. Similarly integrating permanent crops on arable and permanent grassland (at any density) does not forfeit Pillar I payments (Mosquera-Losada et al. 2016). Hence in situations where a farmer wishes to plant trees and is concerned about Pillar I eligibility, then he/she could be advised to plant permanent crops as listed in Annex 1 of Regulation 1308/2013. However there are situations where a farmer wants to integrate tree species that are **not** designated as permanent crops by Annex 1 of Regulation 1308/2013. In such systems, the trees will not result in a deduction of direct payments if they are designated as landscape features. It is possible to identify up to a maximum of 100 trees per hectare if arable land or permanent grassland

is the main land cover (Regulation 640/2014). However, due to the administrative burden associated with the declaration of landscape features many, if not most, farmers lose direct payments at a plot scale. Moreover, member states can also select the pro-rata system on which the woody component of permanent grassland is discounted in spite of the ecosystem services they deliver (Mosquera-Losada et al. 2016).

Table 4. Agroforestry on agricultural land occurs in three major forms: agroforestry on arable land (silvoarable, hedgerow, windbreak and riparian buffer strips), agroforestry on permanent grassland (silvopastoral practices such as dehesa, montado, wood pasture; and hedgerows, windbreaks, and riparian buffer strips), and the grazing and intercropping of permanent crops.

Agroforestry on arable land	Agroforestry on permanent grassland	Agroforestry with permanent crops
		
		
		

In addition to the burden linked to identifying landscape features, farmers have two main concerns regarding the eligibility of agroforestry:

a) the limitation to 100 trees per hectare in the current CAP, without identifying these trees as mature trees, prevents farmers from establishing, promoting and using agroforestry practices. Moreover, those trees with less than 4 m of width are not protected and discounted from farmers' direct payments.

b) the introduction of agroforestry with less than 100 trees per hectare is not clearly linked to the final tree density. This works counter to silvicultural principles that link plantations with initial higher densities (low canopy cover) to select better trees when they become mature (interpretation of the 100 mature tree/ha rule in Article 9 of Regulation 640/2014). The argument to limit the tree density is to guarantee agricultural production, but, significant agricultural production can be obtained under different trees combinations with different densities when they are young (low tree canopy cover) or old.

There should be mechanisms for farmers to establish, maintain, and improve agroforestry practices on their land whilst retaining full direct payments. One way to achieve this is for farmers to identify “agroforestry practices” and secure Pillar I payments through the development of an agroforestry management plan.

Recommendation 4: Agroforestry Direct Payments and Management plans

Agroforestry practices on arable and permanent grassland should be fully eligible if developed with i) a “management plan” including a minimum tree density (to be selected by member states), an initial tree density, and the pursuit of a final maximum tree density that should be less than 100 mature trees per hectare (if no Established Local Practices are declared) or ii) through Measure 222 and 8.2.

In order to simplify eligibility rules for direct payments for agroforestry practices we propose that an ‘agroforestry option’ should be implemented in all three categories of land use (i.e. arable land, permanent grassland and permanent crops). This would be self-declared by the farmer and supported/evidenced by the submission of a management plan.

Agroforestry practices established with permanent crops should be promoted as it does not cause CAP eligibility problems.

5.1.1 Agroforestry on arable land

Regulation 1307/2013 Article 4(f) defines “arable land” as “*land cultivated for crop production or areas available for crop production but lying fallow...*” EU delegated regulation 640/2014 Article 9 explains that “*an agricultural parcel that contains scattered trees shall be considered as eligible area provided that the following conditions are fulfilled: (a) agricultural activities can be carried out in a similar way as on parcels without trees in the same area; and (b) the number of trees per hectare does not exceed a maximum density*”. It also states that this maximum density “*shall be defined by Member States and notified on the basis of traditional cropping practices, natural conditions and environmental reasons. It shall not exceed 100 trees per hectare. However, that limit shall not apply in relation to the measures referred to in Articles 28 [i.e. an agri-environment-climate measure] and 30 [i.e. a Natura 2000 and Water Framework Directive measure] of Regulation (EU) No 1305/2013*”. However despite the above wording, many farmers incorporating trees (that are not classified as permanent crops) on arable land find that their direct payments are reduced.

Silvoarable agroforestry and hedgerow, windbreak and riparian buffer strips should be promoted on arable land. In places, the reduction of wind speeds and soil erosion can lead to substantial increases in arable crop productivity (up to 20% in windy areas with surrounding hedgerows) and improves resilience against extreme weather. Agroforestry on arable land can also provide additional products

(e.g. wood-fuel), improve soil structure, reduce nitrate leaching, and increase carbon sequestration (mitigating climate change).

Recommendation 5: Agroforestry and direct payments on arable land

Agroforestry (e.g. silvoarable agroforestry and hedgerow, windbreak and riparian buffer strips) should be promoted and be **fully** eligible for direct payments on arable land if a management plan is developed, where a minimum specification (selected by member states) and a maximum (100 mature trees per hectare) should be included, as it can increase arable crop and woody vegetation productivity and/or resilience and the delivery of regulating ecosystem services such as increased carbon storage, reduced runoff, and improved water quality.

5.1.2 Agroforestry on permanent grassland

Regulation 1307/2013 Article 4(h) defines “permanent grassland” as *“land used to grow grasses or other herbaceous forage naturally (self-seeded) or through cultivation (sown) and that has not been included in the crop rotation of the holding for five years or more; it may include other species such as shrubs and/or trees which can be grazed provided that the grasses and other herbaceous forage remain predominant as well as, where Member States so decide, land which can be grazed and which forms part of established local practices where grasses and other herbaceous forage are traditionally not predominant in grazing areas”*.

Agroforestry on permanent grassland includes silvopasture and hedgerows, windbreaks and riparian buffer strips. Integrating woody vegetation on grassland can improve fodder production and provide additional food sources (e.g. acorns, tree fodder) during periods of drought, hence leading to a reduced need for external inputs. For example *Morus alba* has a protein content over 20%. Integrating woody vegetation can also provide shade and shelter to animals during periods of extreme temperature. For these reasons the deliberate inclusion of woody components (shrubs, small trees) for fodder (mainly leaves and fruits) on permanent grassland should be fully eligible even if they occupy above 50% of the land cover. An agroforestry management plan, or the establishment of agroforestry through Measures 222 or 8.2, should ensure the possibility of an agroforestry practice to be implemented in permanent grassland land cover. In the EU, farmers who want to gain the benefits of agroforestry on permanent land should be advised where appropriate to plant shrub legume species and trees species identified as permanent crops (e.g. fruit trees, olives).

Recommendation 6: Agroforestry and direct payments on permanent grassland

Permanent grassland areas where grasses and other herbaceous forage are traditionally not predominant should be **fully** eligible for direct payments if an agroforestry management plan is developed to increase the resilience of grazing systems (e.g. reducing external inputs dependence, reducing fire risk) from a productive point of view, while enhancing ecosystem services (e.g. promoting biodiversity). The management plan will allow agroforestry on permanent grassland (silvopastoralism) to be fully eligible for direct payments between a minimum specification (selected by member states) and a maximum of 100 mature trees per hectare when the pro-rata system is not selected by the member state.

5.1.3 Grazing and intercropping of permanent crops

Regulation 1307/2013 Article 4(g) defines "permanent crops" as *"non-rotational crops other than permanent grassland and permanent pasture that occupy the land for five years or more and yield repeated harvests, including nurseries and short rotation coppice"*. Hence "permanent crops" include short rotation coppice and apple and olive trees, among others.

Farmers working with **permanent crops** have no Pillar I CAP limitation related to tree density to develop silvopastoral and silvoarable agroforestry practices. However such systems are not adequately promoted by Pillar I of CAP. Agroforestry promotion in permanent crop lands is supported by Pillar II mainly through the enhancement of grazing orchards. The promotion of such systems can help support decision 529/2013 (Mosquera-Losada et al. 2016) which deals with agricultural mitigation and adaptation measures to reduce the impact of climate change, the reduced use of fuel in the transport of inputs (less fertilization is required as an efficient use of nutrients is obtained (enhanced re-use and recycling)) and more food is produced at a local level (enhancing local markets and reducing fuel consumption from abroad imports). There are also some crops such as medicinal plants (*Melissa* or *Mentha*) that can achieve higher active compounds when growing under shade and these could be promoted in permanent crop systems.

Recommendation 7: Grazing and intercropping of permanent crops

The grazing (silvopasture) and intercropping (silvoarable) of permanent crops are fully eligible under Pillar I and these practices should be further promoted. Integrating animals in permanent crops improves nutrient recycling and reduce inputs at plot level and some crops and varieties can benefit from the shade provided by woody vegetation whilst also increasing the sustainability of the permanent crop system.

In cases where farmers are seeking greening payments, they should be able to develop an agroforestry management plan indicating the agricultural use of the understorey compatible with the permanent crop.

5.2 Greening payments

Regulation 1307/2013 paragraph 37 explains that Pillar I includes mandatory greening payments which *"support agricultural practices beneficial for the climate and the environment"*. These are effectively a release of 30% of the basic payment which is held back unless the farmer can demonstrate practices *"that go beyond cross-compliance and that are linked to agriculture, such as crop diversification, the maintenance of permanent grassland, including traditional orchards where fruit trees are grown in low density on grassland, and the establishment of ecological focus areas."*

Any farmer with more than 15 ha of (non-organic) arable land is expected to show that an area equivalent to 5% of the owned arable land is recorded as an Ecological Focus Area (EFA). The inclusion of landscape features and agroforestry as part of the Ecological Focus Area (EFA) is intended to further protect the woody component by providing some funds for the ecosystem services they deliver. However, in most Member States, greening is more commonly linked to options other than agroforestry or landscape features. In the case of the agroforestry option for EFA, only those agroforestry plots planted under Measures 222 and 8.2 of the previous and current CAP can be

designated as part of the EFA. However, implementation of 222 and 8.2 is linked to a whole plot and not only to 5% of the plot, which is the maximum amount of land allowed for the EFA payments. The low adoption of landscape features can also be explained by the complexity of controlling them and avoiding double funding as these features are also financed by the Rural Development measures (mainly related to the agro-environment measure). Funds cannot be given to the same activity and choosing different options for the same land use activities is compulsory to avoid double funding; this generates a significant burden and makes it difficult to control and evaluate the real impact on farm activities. The fact that landscape features can be found elsewhere in the CAP linked to sustainability of agricultural systems makes their protection complicated and, above all, difficult to evaluate. To understand how policy drives the presence or enhancement of these landscape features is crucial for knowing if the policy is correct or not and to identify and propose future policy improvements.

Moreover, agroforestry has been recognized by the FAO as one of the most effective practices to mitigate and adapt to climate change and hence it should receive full greening payments.

Recommendation 8: Agroforestry and greening

In addition to the current three sections of “Greening” (crop diversification, the maintenance of permanent grassland, and the establishment of EFAs), a fourth section of Agroforestry should be included because agroforestry is one of the most powerful and effective tools to mitigate and adapt agriculture to climate change. This new section should include areas of agroforestry associated with a management plan (with a minimum tree density (to be selected by Member states) and a maximum of 100 mature trees per hectare (if not linked to Established Local Practices)) and those lands receiving payments to establish agroforestry under Measure 222 and 8.2. This new section will make it easier to implement policies and follow up their impacts, whilst mitigating and adapting to climate change such as LULUCF. In the case of a percentage target (currently 5%) of EFA remains in the future CAP, agroforestry should also be an option to be counted for fulfilling the greening for the whole farm.

6 Rural development to foster agroforestry (Pillar II)

Pillar II of the Common Agricultural Policy is substantially more flexible than Pillar I and national governments are able to support a range of agroforestry practices both on agriculture and forest land.

6.1 Highlighting agroforestry in the Rural Development Regulations

Mosquera-Losada et al. (2016) identified 27 measures within the 2014-2020 Rural Development Regulations, including Measure 8.2, that could support the deliberate integration of woody vegetation with farming. However the segregation of measures also makes it really difficult to have a comprehensive overview of the promotion of the different agroforestry practices through Pillar II of the CAP. Therefore, there is a lack of knowledge and links between the money spent on agroforestry and the impact of the policy to promote agroforestry. Agroforestry promotion should be simplified in the post 2020 rural development regulations in a unique measure promoting the use of the woody component in agrarian and forestry systems. This would clearly identify the important role

agroforestry has to play in improving the sustainability of European farming systems, and allow proper evaluation of the impact of such support.

Much of Pillar II focuses on the delivery of environmental benefits. The lack of an adequate link between Pillar I and Pillar II prevents farmers from adopting and implementing Measures 222 and 8.2. New agroforestry practices promoted by Pillar II (CAP 2014-2020) often have an initial tree density of more than 100 trees per hectare, which currently prevents the land being eligible for direct payments from Pillar I. This loss of payments from Pillar I has probably deterred farmers from implementing this form of agroforestry. Although the funding available for the maintenance of new agroforestry systems has increased from 0 (2007-2013) to 5 years in the 2014-2020 RDP, this is still less than that available for afforestation. The current difference between the maintenance payments of afforested/reforested lands (10 years) and agroforestry (5 years) has also probably reduced the adoption of agroforestry Measure 8.2.

We propose that the promotion of woody vegetation in Pillar I should be carried out through the use of specific good agroforestry practices (silvopasture, silvoarable, riparian buffer strips) to integrate woody vegetation in the different types of land use (permanent crops, permanent grasslands and arable lands) and in the greening of Pillar I. Pillar II should be more focussed on the global concept of Rural Development through activities linked to the establishment of agroforestry practices (silvoarable, riparian buffer strips, homegardens, forest farming and silvopasture) on lands that are able to receive (agricultural lands) or not receive (forest lands) Pillar I payments. Pillar II should also foster agroforestry through other activities promoting agroforestry such as marketing of agroforestry products (i.e. agroforestry labels, tourism in areas with a woody component, payments for ecosystem services delivery, or payment for results), and to approach activities related to farm and landscape level optimization by the use of woody vegetation.

Recommendation 9: A unique agroforestry measure in Pillar II

There should be a single “agroforestry” measure, encompassing the five agroforestry practices (Table 1), that supports agroforestry and includes the different activities linked to the 27 measures currently supporting agroforestry in Pillar II, across a range of land covers (e.g. agriculture (silvopasture, silvoarable, hedgerows and riparian buffer strips), forestry (forest farming, silvopasture, silvoarable) and peri-urban (homegardens) lands). Those linked to arable lands should be fully eligible for Pillar I payments if less than 100 mature trees per hectare are intended as final tree density.

6.2 Agroforestry measures in agricultural land

In the 2007-2013 CAP, the uptake of the afforestation measure was generally high whereas that for agroforestry was low (Mosquera-Losada et al. 2016). One reason for this is that the payments for tree establishment in the agroforestry measure were lower than in the afforestation measure, and there was a lack of clarity on the eventual designation of the agroforestry land to further receive direct payments. Only areas where there was no agroforestry could receive the establishment funds from Measure 222.

In the 2014-2020 rural development programmes, there are again two measures specifically supporting tree planting on agricultural land. One measure (8.1) supports afforestation/reforestation

and the other (8.2) supports the establishment and maintenance of agroforestry practices. The agroforestry measure applied only to agroforestry areas comprising a payment for establishment and maintenance (5 years payment related to an assumed reduction in the net financial return from the land). The number of years for maintenance payments under 8.1 is 10, which makes farmers currently more likely to use measure 8.1 than 8.2. No specific funds are allocated to improve the management and restoration of already existing agroforestry lands in a clear way. The improved uptake of agroforestry measures depends on i) clear methods to allow continued eligibility for direct payments under Pillar I and ii) for there to be an option for farmers already practising agroforestry on agricultural land to secure payments.

Recommendation 10: Support for agroforestry establishment or management on agricultural land

Farmers should be given the option to undertake i) establishment of agroforestry on agricultural land including maintenance payments similar to that of afforested/reforested lands and ii) improved management and recovery of already existing agroforestry lands. All areas designated as agroforestry in agricultural lands (arable, permanent grasslands and permanent crops) should be eligible for full greening and basic payments in Pillar I. Both activities should include a management plan with minimum tree densities (to be given by Member states) and a maximum final tree density of 100 mature trees per hectare in arable lands. The management plan should include an appropriate combination of woody species and under storey crop/pasture, and management options for the woody vegetation (e.g. protection, pruning, thinning) and crops/pasture (e.g. sowing, harvesting, animal stocking rate).

6.3 Agroforestry measures in forest land

Agroforestry practices such as forest farming and silvopasture specifically linked to **forest lands** are not funded by Pillar I. Forest farming is the farming, in a forest environment, of non-timber products such as medicinal plants and mushrooms. Forest farming is currently a poorly recognized activity across Europe and some extraction methods can undermine production and biodiversity. There are ways in which different Pillar II measures can help to enhance the value of the products and to support appropriate extraction systems that enable sustained production and improve biodiversity. Honey is another speciality products that can be delivered from both forests and arable, permanent grassland and permanent crops in Pillar I. A measure dealing with the enhancement of this type of product is needed, to connect agriculture with forestry within a circular economy context.

In many places, forest grazing provides environmental benefits, for example it can reduce forest fire risk in some areas, and increase biodiversity through the creation of micro-environment heterogeneity from faeces, and selective consumption and trampling mimicking the presence of wild large mammals in nature (Mosquera-Losada et al. 2016). Moreover, the use of biomass from those areas should also be promoted to maintain the forest health (by extracting the excess of dead wood whilst respecting biodiversity purposes) and to enhance the circular economy (fuel substitution by biomass).

Recommendation 11: Support for agroforestry establishment or management on forest land

There should be agroforestry promotion linked to forest areas to help finance the establishment and maintenance (for the same period that afforestation and reforestation measure in new agroforestry lands) of forest farming and forest grazing (if not included as Established Local Practices). This should also support the improved management of forest farming and forest grazing of existing agroforestry areas. Given the increasing risk of forest fires in Europe, the next Rural Development Programme should include support for silvopasture (forest grazing), within the agroforestry measure, and Member States should be encouraged to implement it.

6.4 Agroforestry at farm level including climate change

In addition to the Pillar II measures to promote agroforestry at a plot level, there should be opportunities to encourage farmers to provide enhanced ecosystem services (Haines-Young and Potschin 2013) and products at a **farm-level** that promote the environment and therefore the society health and ecosystem service deliveries (CICES 2013). For example farmers have an important role in reducing land-based greenhouse gas (GHG) emissions, and agroforestry is a particularly effective method for taking up carbon dioxide and avoiding emissions. Hence there should be opportunities for farms to develop farm-level greenhouse gas reduction plans, using tools such as life cycle assessment (LCA) and carbon footprints. If a farm is able to generate net reductions of GHG then the farmer should be able to gain a carbon credit. In a similar way a farm-level approach may also be applied, on a payment by results basis, to other environmental services such as biodiversity, water, soil and air quality to pursue climate change adaptation and mitigation. Indicators should be adapted and put in the biogeographic context of the farm, using adequate and adapted coefficients, giving more importance to those that are more relevant for each specific context and having different targets depending on the context of the area (i.e. different hazards such as wind, flooding, and fire risk).

Recommendation 12: Agroforestry at a farm-level including climate change

Result-based payments can be delivered if agroforestry is implemented at a farm-scale as it has substantial potential to contribute to European targets such as addressing climate change, improving resource use, farming systems resilience (i.e. extreme events) biodiversity, and water quality. There should be opportunities for farms or groups of farmers to develop GHG and carbon accounting plans such as LCA and C footprints. A Pillar II scheme is needed to incentivise “climate-smart” farming which will in turn support agroforestry.

6.5 Promoting agroforestry at landscape-level

Besides the parcel and the farm level, agroforestry plays a clear role at territorial and landscape levels (Figure 1) where it can improve the health and well-being of both rural and urban societies. This scale should be supported by local and regional authorities making use of co-operation measures that allows co-ordinated responses across the farms and fields of different farmers (Figure 1).

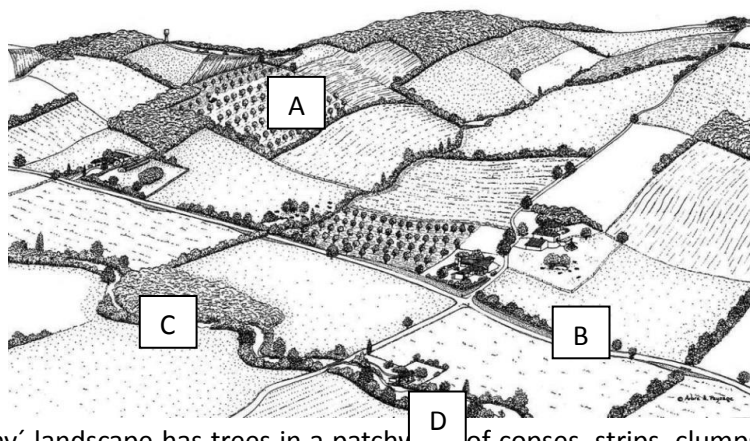


Figure 1. A 'healthy' landscape has trees in a patchwork of copses, strips, clumps and lines. Isolated trees in fields are particularly valuable. With appropriate support, farmers can help plan the use of trees in areas subject to erosion (A) or flooding (C). Trees can also be sited along roads (B) and streams (D), with the latter serving as riparian buffers to reduce nitrate and sediment reaching water courses. Drawing by D. Dellas (Arbre et Paysage 32).

Recommendation 13: Co-operation measures for sustainable landscapes

The European Union should support co-operation measures which allow the benefits of agroforestry to be recognised at landscape-level. This can be achieved by facilitating co-operation between farmers within a catchment including landscape linking biodiversity of habitats.

6.6 Promoting agroforestry in the value-chain

Rural employment and livelihoods should be enhanced to improve rural people lives. One way to do this is through the promotion of the recognition of the high quality products and ecosystem services that agroforestry delivers, by appropriate local market promotion and agroforestry identification (labelling) (Tscharntke et al. 2012). This will enhance the added value of these products and increase recognition from the general public of the sustainability of these systems for protecting the countryside and delivering better water quality, air quality and healthy food. Homegardens as an agroforestry practice can be enhanced to promote high quality self-consumption and selling at local scales. For this, cooperation of farmers with all actors within and between the value chains of the different products delivered in agroforestry should be supported.

Recommendation 14: Agroforestry and the value-chain

The European Union should support co-operation measures which allow the benefits of agroforestry to be recognised within the value chain. This can be achieved by facilitating co-operation between farmers with different partners along the value chain embedded, for example, within the EIP-Agri activities. Policy changes should encourage joined-up thinking between agricultural and forestry sectors fostering the circular economy.

6.7 Education

A farmer survey within AGFORWARD has highlighted the lack of knowledge about agroforestry among many farmers (Rois et al. 2017). Agroforestry education is needed to promote agroforestry within the CAP. Agroforestry is knowledge intensive, and so needs to be supported through excellent

well-trained and independent extension service providers. Activities related to EIP-Agri and extension services promotion will contribute to extending this type of land use, but also to the better quality of life of rural and urban citizens. The integration of agroforestry within the school and college education system is crucial to make future farmers but also end-users aware of the benefits of integrating woody vegetation with agriculture at local, regional and global scales.

Recommendation 15: Agroforestry and education

Agroforestry is knowledge intensive, and so needs to be supported through excellent well-trained and independent extension service providers. Activities related to EIP-Agri, extension services, knowledge co-creation should be promoted under relevant Pillar II measures.

7 Conclusions

The current Common Agricultural Policy has complicated rules for agroforestry implementation and often this has the perverse effect of simplifying the farmed landscape. Even though there is a clear recognition of the positive role of woody vegetation in delivering ecosystem services, it is unclear how this vegetation fits in the whole CAP (with many rules for the landscape features linked to cross-compliance but also to greening and Pillar II). Simplification should be applied in a consistent way to enable land managers to use woody vegetation to gain the benefits for production and the environment that can be achieved. Our aim was to produce simple rules that create profitable, dynamic and biodiverse farming enterprises, landscapes and communities.

Pillar I: Agroforestry on farms (e.g. silvopasture, silvoarable and hedgerow, windbreak and riparian buffer strips) to deliver ecosystem services (e.g. carbon sequestration and biodiversity enhancement) positively addresses the objectives of the CAP. It can be promoted in a simple and straightforward way. Agroforestry with permanent crops is already directly eligible for basic payments. Agroforestry should also be fully eligible for basic payments in the Pillar I agricultural lands layers of arable and permanent grassland when linked to an appropriate management plan. Agroforestry areas should also directly receive the payments linked to greening because of the benefits of agroforestry for the climate and the environment if linked to a management plan.

Pillar II of the CAP should promote agroforestry through payments to enhance agroforestry practices (silvopasture, silvoarable, hedgerows, windbreaks and riparian buffer strips) on agricultural land and in forests (forest farming and silvopasture). It is also important to improve farm management (LCA and C foot print). Rural promotion through agroforestry enhancement could also be achieved through the establishment of cooperation to act at landscape and value chain level, increasing the sustainability of farms at different levels (carbon foot print and LCA but also market and labelling). Education at different levels is a key aspect to foster agroforestry and enhanced through activities like those developed under the EIP-Agri framework.

Global Recommendation

A European Agroforestry Strategy should be designed to foster agroforestry in Europe. Such a strategy should include aspects related to current promotion, education, innovation and research on agroforestry at a European level, and provide guidance for national agroforestry strategies.

8 Acknowledgements

The AGFORWARD project (Grant Agreement N° 613520) is co-funded by the European Commission, Directorate General for Research & Innovation, within the 7th Framework Programme of RTD, Theme 2 - Biotechnologies, Agriculture & Food. We are aware that policy development is a dynamic process and we are thankful for the inputs and discussions that we have had from policy makers, managing authorities and other NGOs. The views and opinions expressed in this report are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission.

9 References

- AFTA (Association for Temperate Agroforestry) (2016). What is Agroforestry? Accessed 31 August 2016. <http://www.aftaweb.org/about/what-is-agroforestry.html>
- Briner G, Konrad S (2014). Planting the foundations of a Post-2020 land sector reporting and accounting framework, Climate Change Expert Group. Available at: [http://www.oecd.org/env/cc/\(2014\)6%20Planting%20the%20Foundations-rev-FINAL.pdf](http://www.oecd.org/env/cc/(2014)6%20Planting%20the%20Foundations-rev-FINAL.pdf).
- Bruyninckx H (2016). Europe's Response to Sustainability Challenges - Delivering on the UN 2030 Agenda, 20 December 2016 Brussels https://ec.europa.eu/epsc/events/europes-response-to-sustainability-challenges_en
- Burgess PJ, Crous-Duran J, den Herder M, Dupraz C, Fagerholm N, Freese D, Garnett K, Graves AR, Hermansen JE, Liagre F, Mirck J, Moreno G, Mosquera-Losada MR, Palma JHN, Pantera A, Plieninger T, Upson M (2015). AGFORWARD Project Periodic Report: January to December 2014. Cranfield University: AGFORWARD. <http://www.agforward.eu/index.php/en/news-reader/id-27-february-2015.html>
- CICES (2013). Common international classification of ecosystem services (CICES). Consultation on version 4 https://cices.eu/content/uploads/sites/8/2012/07/CICES-V43_Revised-Final_Report_29012013.pdf
- Cork Declaration (2016). https://ec.europa.eu/agriculture/events/rural-development-2016_en
- European Court of Auditors (2009). European Court of Auditors Special report 8/2008: "Is Cross compliance an effective policy?" http://www.eca.europa.eu/Lists/ECADocuments/SR08_08/SR08_08_EN.PDF
- den Herder M, Moreno G, Mosquera-Losada MR, Palma JHN, Sidiropoulou A, Santiago Freijanes JJ, Crous-Duran J, Paulo JA, Tomé M, Pantera A, Papanastasis VP, Mantzanas K, Pachana P, Papadopoulos A, Plieninger T, Burgess PJ (2017). Agriculture, Ecosystems and Environment 241: 121-132.
- EU (2012). Consolidated version of the treaty of the functioning of the European Union. 26 October 2012. <http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A12012E%2FTXT>
- EU (2014). Sub-measure fiche (annex II to the measure fiche "forestry") Establishment of agroforestry systems Measure 8.2. http://www.ead.gr/images/pdf/articles/%CE%A7%CE%A1%CE%97%CE%A3%CE%99%CE%9C%CE%95%CE%A3_%CE%A0%CE%9B%CE%97%CE%A1%CE%9F%CE%A6%CE%9F%CE%A1%CE%99%CE%95%CE%A3/08_Measure_Fiche_Art_23_agroforestry_NOV_14.pdf
- EURAF (2017). Agroforestry in Europe. Accessed 1 May 2017. <http://www.agroforestry.eu/>

- FAO and World Bank (2001). *Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World*. (Ed. J. Dixon, A. Gulliver and D. Gibbon). FAO and World Bank: Rome and Washington D.C. <http://ftp.fao.org/docrep/fao/003/y1860e/y1860e.pdf>
- FAO (2015). Agroforestry. <http://www.fao.org/forestry/agroforestry/80338/en/>
- García de Jalón S, Burgess PJ, Graves A, Moreno G, McAdam J, Pottier E, Novak S, Bondesan V, Mosquera-Losada MR, Crous-Durán J, Palma JHN, Paulo JA, Oliveira TS, Cirou E, Hannachi Y, Pantera A, Wartelle R, Kay S, Malignier N, Van Lerberghe P, Tsonkova P, Mirck J, Rois M, Kongsted, AG, Thenail C, Luske B, Berg S, Gosme M, Vityi A (2017). How is agroforestry perceived in Europe? An assessment of positive and negative aspects among stakeholders. *Agroforestry Systems*. DOI 10.1007/s10457-017-0116-3
- Government of India (2014). *National Agroforestry Policy 2014*. Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi, India. <http://www.indiaenvironmentportal.org.in/files/file/Agroforestry%20policy%202014.pdf>
- Haines-Young R, Potschin M (2013). *Common International Classification of Ecosystem Services (CICES): Consultation on Version 4, August-December 2012*. EEA Framework Contract No EEA/IEA/09/003 http://test.matth.eu/content/uploads/sites/8/2012/07/CICES-V43_Revised-Final_Report_29012013.pdf
- Milne R et al. (2003). Basis for consistent representation of land areas, Chapter 2, Intergovernmental Panel on Climate Change (IPCC). Available at: <http://lup.lub.lu.se/record/838322>
- Mosquera-Losada MR, McAdam JH, Romero-Franco R, Santiago-Freijanes JJ, Rigueiro-Rodríguez A (2009). Definitions and components of agroforestry practices in Europe. In: *Agroforestry in Europe: Current Status and Future Prospects* 3-19. Eds. Rigueiro-Rodríguez AR, McAdam J, Mosquera-Losada MR. Springer.
- Mosquera-Losada MR, Santiago Freijanes JJ, Pisanelli A, Rois M, Smith J, den Herder M, Moreno G, Malignier N, Mirazo JR, Lamersdorf N, Ferreiro Domínguez N, Balaguer F, Pantera A, Rigueiro-Rodríguez A, Gonzalez-Hernández P, Fernández-Lorenzo JL, Romero-Franco R, Chalmin A, Garcia de Jalon S, Garnett K, Graves A, Burgess PJ (2016). Extent and success of current policy measures to promote agroforestry across Europe. Deliverable 8.23 for EU FP7 Research Project: AGFORWARD 613520. (8 December 2016). 95 pp. <http://www.agforward.eu/index.php/en/extent-and-success-of-current-policy-measures-to-promote-agroforestry-across-europe.html>
- Nair PKR (1994). *Agroforestry encyclopedia of agricultural sciences*, vol 1, 13-25. Academic New York
- Tscharntke T, Clough Y, Wanger TC, Jackson L, Motzke I, Perfecto I, Vandermeer J, Whitbread A (2012). Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation* 151: 53-59.
- United Nations (2015). *Sustainable Development Goals*. <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- USDA (2011). *USDA Agroforestry Strategic Framework, Fiscal Year 2011–2016*. https://www.usda.gov/sites/default/files/documents/AFStratFrame_FINAL-Ir_6-3-11.pdf