

## Silvopastoral systems: analyses of an alternative to open swards

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**Keywords:** silvopasture, multiple land use, ecosystems, environment, production, western Europe

**Introduction** Silvopasture is a sustainable land use management practiced in most continents in the world including parts of southern Europe, but is not broadly used in northern and western Europe. The importance of this practice has been recognised and the last draft of the EU regulation by the European Agricultural Fund for Rural Development ([http://europa.eu.int/comm/agriculture/capreform/rurdevprop\\_en.pdf](http://europa.eu.int/comm/agriculture/capreform/rurdevprop_en.pdf)) includes specifically funding for establishment of agroforestry practices in Europe. This paper discusses the advantages of managing semi intensive grassland within a silvopastoral system from an ecological, productive and social point of view in the south, south-central and western countries of Europe.

**Materials and methods** A comparison between intensively managed open swards (with high nitrogen inputs and concentrate use) and silvopastoral land use was made based on a review of research and statistical data from Greece, Italy, Spain, France and United Kingdom grouped in three areas: Mediterranean, Atlantic with dry summers and Atlantic with humid summers.

**Results** The main advantages of silvopastoral systems from a productive, ecological and social point of view and across the different climatic regions of Europe are shown in Table 1. Generally, productivity is higher in silvopastoral systems, as they combine short and long term returns from land. Other relevant aspects are that silvopastoral systems will enhance production of other products, such as medicinal plants or mushrooms. Silvopastoral systems will also allow extension to the grazing season because pastures growing under trees usually have more favourable temperature (lower in summer and higher in winter) and humidity profiles than open swards. This will reduce concentrate use per year. Stocking rates will also be lower than those in intensive systems. From an ecological point of view, silvopastoral systems present a good tool for carbon sequestration and reduced nitrogen contamination with N efficiency being promoted through uptake by tree roots. Biodiversity is enhanced through the creation of spatial diversity in the habitat, which increases the number of species and the continuity between forests and cropped land. Silvopastoral systems are needed in those areas where fire risk is important. Overstocking promotes erosion, compared with forestry land, as well as reducing regeneration. This can be solved when regeneration is an objective through use of tree protectors or by fencing areas. From a social point of view these systems enhance rural population stabilisation and tourism is favoured by multiple land use.

**Table 1** Qualitative characterisation of advantages of silvopastoral systems (G: Greece; I: Italy; F: France; Sp: Spain; I: intensive grassland; S: Silvopastoral; pop: population; stab: stabilisation; P: productive; E: Ecological; S: Social; Med: Mediterranean, DS: Dry summer; HS: Humid Summer). 1: highest value, 2: lowest value

		Med		Atlantic						Med		Atlantic				
		G,I,Sp		DS		HS				G,I,Sp		DS		HS		
		I	S	I	S	I	S			I	S	I	S	I	S	
P	Global productivity/year	2	1	2	1	2	2	E	Fire risk reduction	1	1	1	1	-	-	
	Animal production	1	2	1	2	1	2		Erosion reduction	2	2	2	2	2	2	
	Animal product quality	2	1	2	1	2	1		Carbon sink	2	1	2	1	2	1	
	Short term return	1	2	1	2	1	2		Animal welfare	2	1	2	1	2	1	
	Long term return	2	1	2	1	2	1		Biodiversity	2	1	2	1	2	1	
	Other products	2	1	2	1	2	1		N leaching reduction	1	2	1	2	1	2	
	Extended grazing	2	1	2	1	2	1		S	Tourism	2	1	2	1	2	1
	Stocking rate	1	2	1	2	1	2			Rural pop. stab.	1	1	1	1	1	1
	Concentrate use/year	1	2	1	2	1	2			Landscape amenity	2	1	2	1	2	1

**Conclusions** This study demonstrates that silvopastoral systems are a means of managing grassland in a sustainable way as they increase the output of animal and other products, increase biodiversity, extend the grazing season, reduce concentrate use, stocking rate, fire risk, erosion, habitat fragmentation and N leaching whilst enhancing landscape amenity and carbon storage compared with high input farms.