



AGROFORESTRY IN PRACTICE

Guide for practical application



2023, Podgorica



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Agroforestry - what is it and why is it important?

Agroforestry is a land use system in which trees and shrubs are combined with agricultural crops and livestock production as a part of a single system (USDA). The advantage of these systems is that they increase environmental, economic and social benefits.

In recent decades, as a result of human activities and climate changes, the stability of forest and agricultural ecosystems has been threatened, and the acceleration of degradation processes is noticeable. These changes are reflected in the loss of biodiversity, soil degradation, soil and water losses. It is expected that under the influence of climate change, the mentioned problems will become more pronounced in the coming period.

This is also the reason why EU strategies indicate a cross-sectoral, common approach to solving these problems, creating connected information systems for monitoring key parameters, as well as improving education in areas such as agroforestry.

In the European framework, the field of agroforestry is recognized as extremely important, bearing in mind that the basic regional component of Europe is basically agroforestry by its characteristics. As stated in the EU forest Development Strategy until 2030, it is extremely important to use abandoned rural areas wisely, and silvopastoral and other agroforestry practices are cited as examples.

This Guide provides practical information for the introduction of the forest component into conventional agricultural production systems and the establishment of agroforestry systems characteristic of part of the Western Balkans region. The guide contains information on how agroforestry systems can be established and be a complementary part of traditional agricultural production.





Agroforestry practices in Southeastern Europe and the Western Balkans

Different agroforestry practices are characteristic of the region of Southeastern Europe and the Western Balkans. In the north of Serbia, in Vojvodina and in Bulgaria, agrisilvicultural systems (forest protection belts) are dominant, in Croatia and Slavonia it is agrosilvopastoral systems, while for Croatia, in Dalmatia and in Montenegro, silvopastoral systems are characteristic.

Agroforestry systems in the area of the Southeastern Europe and the Western Balkans

Forest protection
belts/field protection
belts - Serbia,
Bulgaria



Agro-silvopastoral
systems - Croatia
(Slavonia), Serbia
(Vojvodina)



Silvopastoral
systems Croatia
(Dalmatia) and
Montenegro





Agroforestry practices in Montenegro

Silvopastoral systems



Silvopastoralism is a system that combines animal husbandry on pastures in a partially wooded environment. In these systems, various ground covers are present: trees, shrubs, and grass. This ecological diversity helps mitigate climate risks by providing a variety of food resources and protecting animals from wind and precipitation while reducing solar radiation.

One particular form of silvopastoralism in Montenegro is the use of mountain pastures during summer on the Katuns. More than 2,000 households in Montenegro still use mountain pastures on katuns and raise cattle, sheep, goats and horses. Most of the meadows and pastures are lined or intersected by various trees or shrubs, which the cattle use during the grazing season for rest or protection from the sun, precipitation or wind.

In the areas adjacent to the forest complexes there are forest pastures, in the cover of which there are species with a slightly larger and more tender growth (with higher water content). Due to irregular use and omitted maintenance measures, young woody and shrub species appear in the area of these pastures, i.e. there is a successive spread of the woods. In terms of floristic composition, these pastures resemble the grassland of the higher hilly and low mountainous areas.



The importance of regular traditional use of high mountain pastures and forest clearings should also be seen from the point of view of preserving exceptional landscape and biodiversity values.

One of the silvopastoral practices is extensive **goat farming** in the southern and partly central part of Montenegro. Goats are known to use dry branches and leaves, i.e. they make very good use of partially overgrown pastures and are a kind of soil cleaner in terms of fire protection.



On the mountain pastures and in the forest areas are bred mostly autochthonous and local breeds of all species of domestic animals, but also more productive (imported) breeds and their mixes. On the territory of Montenegro there is a relatively large number of autochthonous and local breeds and strains of various domestic animal species.

National Program and Action Plan for the Conservation and Sustainable Use of Genetic Resources in Agriculture in the 2008 year set the main priorities and objectives for the conservation of these breeds.



In accordance with this annual budget, the Ministry of Agriculture determines the amount of funds that will be granted for that calendar year as support (subsidy) per animal of the domestic breed included in the program for in situ conservation of genetic resources. In recent years, subsidies were granted for about 1,420 sheep (all autochthonous breeds), 120 cattle busha and about 80 Balkan donkeys.

In these systems, the **breeding of ungulates** (horses and donkeys) has not completely lost its importance. They are common mainly in remote and hard-to-reach areas, where they are still used as working animals (for carrying loads). Horses are breeding more in the northern areas of Montenegro, while donkeys are more common in the central and southern areas.

Today, the use of ungulates for recreation, tourist purposes or the use of donkey milk is more widespread.



Beekeeping is also one of practices in this system. Nectar from the flowers of forest vegetation and honeydew



serve as food for honeybees, and trees provide suitable shelter for bee colonies. Honey is produced in nature in different ways, but in general it can be divided into honey of plant and animal origin. Honey of plant origin is secreted by certain plant species when suitable climatic conditions prevail. The plants then secrete the excess liquid in the form of a sticky, sweet syrup over the surface of their leaves, which the bees collect. Honeydew of animal origin is created when certain types of insects suck plant juices, and then excrete a liquid - honeydew, which contains excess sugar.

Beekeeping in forest areas therefore offers the possibility of simple and quick creation of additional value.

Beekeeping is very important for providing pollination services. The importance and benefit of bees for pollination of plants, maintenance and improvement of biodiversity many times exceeds the direct benefit of honey and other beekeeping products. The best area for combining beekeeping with forestry is in forest hilly areas, although it can be successfully practiced in all forest areas.

Measures for the prevention of damage caused by game are prescribed by the Rulebook on measures to prevent damage and the method and procedure for obtaining compensation for damage caused by game (Official Gazette of the Republic of Montenegro No. 70/2009).



Owners, that is, users of livestock and land are obliged to regularly check the condition of their property, organize its guarding by using leashed dogs, visible scarecrows and sound devices, as well as implement other usual protection measures.

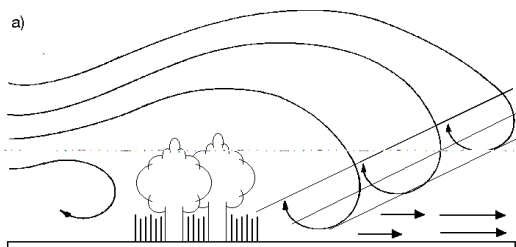
In hunting grounds where there are bears, wolves and jackals, livestock may only be allowed to graze accompanied by a shepherd. In hunting grounds where there are bears, the beehives must be fenced, under the constant supervision of the owner-keeper and with a mandatory guard dog in the beehive.

If, despite the measures taken, the game causes damage, the owner, i.e. the producer of livestock and user of land, submits a request for an assessment of the damage to the user of the hunting ground, within three days from the day he became aware of the damage, and at the latest within 15 days from the day the damage occurred.

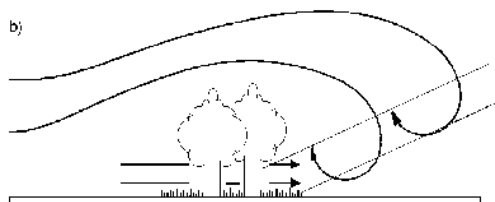
Forest protection belts represent one of the less applied practices of agroforestry in Montenegro. Wind protection (forest/agriculture) belts affect the entire complex of environmental conditions - by reducing the wind speed, they affect the humidity of the soil and air, erosion processes conditioned by the effect of the wind, as well as the spread of pollutants.



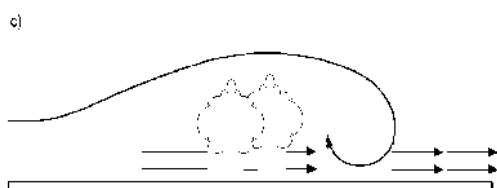
The wind protection effect depends on the aerodynamic characteristics of the belt: height, width, permeability and up-to-dateness. Permeability is determined by the amount and size of the openings (cavities) and their distribution in the belt, while the continuity represents the ratio between the area of the openings and the total area of the belt in the vertical profile. Some permeability is desirable in protective belts. Experience has shown that solid walls provide significant protection immediately behind them on the leeward side, and the effect wears off after a short distance. The basic types of wind protection belts are:



a) Impermeable type - has crowns, trunk, and bushes in the whole profile. The opening area is less than 5 %, while the wind permeability between crowns and trees is less than 30 %.



b) The semipermeable type is characterized by an even distribution of openings throughout the profile. Its wind permeability between the trees is around 30 % and in the crowns from 30-75 %.



c) Permeable type has a complete or partial shade from the canopy in the upper or middle part of the profile, while at the bottom there are openings without bushes. Air permeability ranges from 75% between the trees to 30% in the canopy.

The reduction of wind speed behind the belt results in numerous benefits for agricultural production. The effectiveness of the Shelterbelts/Windbreak in performing the desired functions depends on the correct choice of its structure.

Belts have the most effect when they are installed systemically, in the form of a so-called net. main and secondary belts. However, in accordance with needs and possibilities, they can be designed and erected on small spatial scales at the property level.

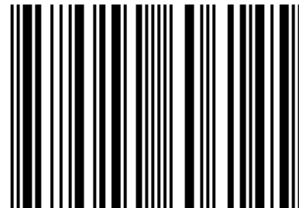
The distance between belts and the choice of species are of particular importance in the design of belts. Species for forest buffer zones should be adapted to environmental conditions, preferably fast-growing, and adaptable to soil and climate constraints.



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