

Module 1 – Agroforestry for Oliviculture
Course 1 – Introduction to Agroforestry for Olive multifunctional system
Chapter 3 – Olive Agroforestry as a Traditional Land Use

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Introduction to Agroforestry for Multifunctional Olive Systems: Olive Agroforestry as a Traditional Land Use

Traditional agroforestry systems may be described as a set of age-old agroforestry systems which are generally devoid of intentional intensified cultivation of agricultural or forage crops and which have been practiced across the world with varying structure, function, socio-economic attributes and ecological services.

S. Viswanath *et al.* (2018)



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Introduction to Traditional Olive Agroforestry

Traditional land use includes all old fashioned practices and techniques.

A very old practice, agroforestry was developed through **coevolution between humans and nature**.

This coevolution provided **numerous ecosystem services to society**:

- Timber, food and fodder production
- Conserving biodiversity of habitats, species, and genotypes
- Carbon sequestration by maintaining soil productivity and promoting sustainable soil use
- Reducing soil erosion and pollution, leading to improved water balance and quality
- Reducing risk of fire
- Spiritual and social benefits

Over the centuries, people have learned how to **sustainably exploit land resources**.



Introduction to Traditional Olive Agroforestry



Agroforestry exists mainly in three forms:

1. Silvoarable systems, with trees and crops grown on arable land.
2. Silvopastoral systems, with trees and pasture/animals grown on forest or arable land.
3. Agrosilvopastoral systems, with trees, crops and animals grazing on arable land.

- The trees may be forest species or cultivated fruit trees.
- The crops may be annual or perennial species.
- The animals may be sheep, goat, cattle, pigs or chickens.



"Landscape view of silvopastoral system at Loughall, Northern Ireland (June 2007), photo taken by Paul Burgess" by [AGFORWARD project, flickr](#) is licensed under [CC BY 2.0](#)



"Asparagus in traditional olive grove" by [AGFORWARD project, flickr](#) is licensed under [CC BY 2.0](#)

Introduction to Traditional Olive Agroforestry



➤ **Agroforestry has the potential to achieve ecosystem sustainability in the following ways:**

- Optimizing agricultural productivity
- Mitigating climate change impact
- Profitability
- Diversity



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["Olive grove"](#) by gichristof, flickr is licensed under [CC BY 2.0](#)



Introduction to Traditional Olive Agroforestry

Benefits of Traditional Agroforestry

Complementary use of agriculture and forestry

- ✓ The complementary use of resources by trees and crops increases yields in agroforestry systems
- ✓ Agroforestry has the potential to bring marginal land into production
- ✓ Agroforestry reduces reliance on synthetic inputs

Environmental benefits of agroforestry

- ✓ Improves soil quality by reducing nutrient leaching and soil erosion
- ✓ Improves biodiversity
- ✓ Improves water quality
- ✓ Remediates contaminated land, reduces greenhouse gases, and increases carbon sequestration
- ✓ Reduces resource-use pressure on native woodlands and slows rates of deforestation

Improved economy & quality of life in rural areas

- ✓ Agroforestry (AF) generates short and long term income
- ✓ AF generates opportunities for skilled jobs
- ✓ AF provides raw materials for other economic activities
- ✓ AF supports the diversification of local economies and products
- ✓ AF increases aesthetic value and creates a sheltered environment for people and animals



Introduction to Traditional Olive Agroforestry



Threats to Traditional Agroforestry

Although traditional agroforestry can offer numerous important benefits, many Mediterranean agroforestry systems, including olive agroforestry, are at risk of major changes that can reduce their positive impact on the ecosystem.

- ✓ Migration from rural to urban areas can lead to abandonment of agricultural land.
- ✓ A shift from traditional to specialized intensive monoculture crop systems can increase farmers' use of agrochemicals and machinery.
- ✓ On a regional and global level, these changes tend to reduce biological diversity and decrease agroforestry's positive impact on the ecosystem, as well as discontinuing traditional cultural patterns and damaging the aesthetic beauty of landscapes and their ability to support agrotourism.

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The History of Traditional Olive Agroforestry

- Nearly 6000 years ago, the development of vegetative reproduction and the selection of the best plant material led to the advancement of olive cultivation.
- Cultivation of olive trees spread with Phoenicians and Greeks to Spain, southern France and North Africa.
- The history of olive cultivation can be traced back 3,500 years in Greece.
- Romans further spread olives within their empire.
- The presence of very old olive trees in many Mediterranean countries indicates that olives were already a widespread crop in ancient times.
- The numerous antique olive presses unearthed throughout the Mediterranean basin attest to the extensive cultivation of olive trees in antiquity.
- Many olive groves were developed by grafting wild olive trees that were already present in natural ecosystems.
- According to recent studies using DNA markers (Besnard and Berville, 2000; Besnard et al., 2001), the origin of *Olea europaea* in the Mediterranean is complicated and linked to multilocal domestication of its cultivated forms.



The History of Traditional Olive Agroforestry



Milad El Riachy



Milad El Riachy



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General Characteristics Of Traditional Olive Agroforestry (TOAF)



- ✓ TOAF is a semi-natural ecosystem that has remained unchanged for centuries.
- ✓ The olive, along with vines and cereals, was the major component of Mediterranean agro- ecosystems.
- ✓ TOAF represented the most traditional agricultural activity of these agro-systems.
- ✓ TOAF is found on mountains and hills, as well as occupied marginalized lands.
- ✓ Olive agroforestry formed an important component of the Mediterranean identity.
- ✓ Olive agroforestry has sustained fragile natural resources by contributing to a high level of bio-diversity and a low rate of erosion, while improving soil fertility.
- ✓ Olive trees have contributed significantly to the rural development of the rain-fed Mediterranean area.
- ✓ Olive agroforestry has provided a significant source of income and employment, particularly in rural areas heavily reliant on agricultural activities.
- ✓ The cultivation of cereals and legumes under the olive trees for both human and livestock consumption boosted the economic value of rural lands.

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General Characteristics Of Traditional Olive Agroforestry: Biodiversity



- The ecosystem of traditional olive groves is quite stable when compared with other agricultural ecosystems for several reasons:
 - The stability of the environment
 - The small number of really pernicious pests
 - Its tolerance for pest damage
 - The abundant beneficial arthropod fauna
- The great plant diversity within Mediterranean olive groves has led to the creation of multiple habitats for animals:
 - 15 insect classes (94-125 families) were identified within agroforestry systems.
 - 31 bird species inhabiting olive groves feed on the diverse species of insects and flora.
 - In Lebanon, 22 bird species inhabit olive orchards in the Rashaya region in the west Beqaa valley.
 - A relatively large number of mammals has also been found in olive groves.





General Characteristics Of Traditional Olive Agroforestry: Biodiversity



Blackbirds (*Turdus merula*)



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Starlings (*Sturnus vulgaris*)



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Barn Owls (*Tyto alba*)



" [73A8507-barn owl](#)" by lonelyshrim, flickr is

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General Characteristics Of Traditional Olive Agroforestry: Biodiversity

- Traditional olive groves are beneficial to the environment since they have low soil erosion rates and high biodiversity.
- Olive orchards growing in degraded and low-productive soils help to slow down the rate of the soil's deterioration.
- Traditional olive agroforestry found on terraced slopes exhibits reduced soil erosion.

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General Characteristics Of Traditional Olive Agroforestry

Traditionally, olive orchards have been bordered by spontaneous shrub vegetation and many tree species, some of them planted within the olive groves.

Plant species associated with olive trees in traditional agroforestry

Trees and shrubs

- Carob, *Ceratonia siliqua* L. الخروب
- Almond, *Prunus dulcis*. اللوز
- Fig, *Ficus carica* L. التين
- Pear, *Sorbus domestica* L. الاجاص
- Mulberry, *Morus alba* L. التوت
- Sumac السماق
- Vines العنب
- Pomegranate, *Punica granatum* L. الرمان
- Myrtle *communis* L. الريحان

Crops

- Grains: wheat, broad beans, peas, lentils, and chickpeas
- Medicinal plants: *Salvia officinalis*, *Thymus* spp., and *Origanum* spp.
- Herbaceous species (oats, barley, vetch, and alfalfa) used as
 - Fresh forage
 - Hay



The Development of Olive Agroforestry

- The first agroforestry systems date back to very ancient times, when forests were cut down or subjected to fires to provide space for the cultivation of fruit trees and crops, as well as grazing animals.
- This happened simultaneously with the development of agriculture.
 - The cultivated olive tree grafted onto wild olives is one of the main types of Mediterranean ecosystems.
 - Olive cultivars were cloned from either direct propagation by using large cuttings, ovules or rooted suckers, or by indirect multiplication by grafting on seedlings.
 - These techniques were used to graft wild olive trees that spread naturally within the forest.
 - This kind of agricultural practice enabled the transformation from forests into new stabilized agricultural lands.
- Within these newly developed agroforestry systems, trees of the original forest were left on the farmland or on the borders of the farm in order to accommodate additional human needs for firewood, fruits or foliage for their animals.
- Over millennia, the widespread practice of intercropping olives with grains and legumes has resulted in the establishment of silvoarable agroforestry systems.



The Development of Olive Agroforestry

Forest trees



By Abdel Kader El

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Traditional Agroforestry



- The integration of cereals into olive orchards was the earliest type of agroforestry system practiced in the Mediterranean area.
- Traditionally, the land occupied by olive orchards was rationally exploited for the production of various agricultural products, primarily cereals and legumes for human and animal consumption.
- Agroforestry systems with large grazed surfaces were characterized by the simultaneous cultivation of olive, almond, and carob trees.
- Spontaneous herbs and shrub species found in olive orchards were regularly grazed during autumn and spring.
- As a semi-natural environment, traditional olive farming has an important ecological function.
- All of these practices have continued to the present day, although they are less common now.

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Traditional Agroforestry

➤ Olive trees have been used in agroforestry in the Mediterranean region since ancient times:

- They were used as living trellises and fences
- They were grown with annual food crops
- Their products were used in livestock systems, fertilizers and medicines
- Ancient olive trees play an important role in limiting soil loss and impoverishment of soil organic matter, as well as helping to control wind and water erosion.

➤ Mediterranean people developed some knowledge of allelopathic effects, for example:

- The negative result of planting vines and cypress near each other
- Growing willow trees near vines causes the fruit to develop an undesirable taste
- People believed that an olive tree would die if planted on a site that was previously occupied by a Quercus (oak) tree, and vice versa

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Traditional Agroforestry Intercropping

- Various plant species were integrated into olive agroforestry systems:
 - Grains - family Poaceae (Gramineae).
 - ✓ These plant species were integrated into olive agroforestry as a fresh and dry fodder for animals, as well as for production of grains.
 - Legumes (beans, peas, lentils, chickpeas, vetch, alfalfa) also served a double purpose:
 - ✓ Forage – fresh and dry
 - ✓ Grain production
 - Vegetables and vines
- Roman farmers divided olive groves into two sections to achieve equal returns every year. In one section of the olive orchards, farmers did not seed annual crops in order to encourage the tree to produce shoots, whereas in the other section they cultivated annual crops to achieve a reasonable yield.

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Traditional Agroforestry

In traditional agroforestry, olive trees were used in various ways:

- Their timber was used for construction, fuel, and animal feed.
- Amurca (a watery sediment that settles out of unfiltered olive oil over time) is a byproduct of the olive tree that was used as a moth repellent, a feed additive for horses, a pesticide, and a fertilizer.
- Clay was mixed with grain chaff and olive dregs to make plaster. This plaster prevented mice and worms from entering grain storage facilities, while also solidifying and hardening grains.



Traditional Agroforestry

Olives and olive oil were not only important components of the ancient Mediterranean diet, but also some of the most successful industrial products in antiquity. They were used in

- ❖ Medicine
- ❖ Illumination
- ❖ Massage

For example, Roman bathers used olive oil in thermal baths to coat their bodies before physical exercises that normally preceded the bathing ritual

- ❖ Soap production
- ❖ Wool processing

Oil obtained from the second pressing of the olives was used for lubricating wool before carding and spinning

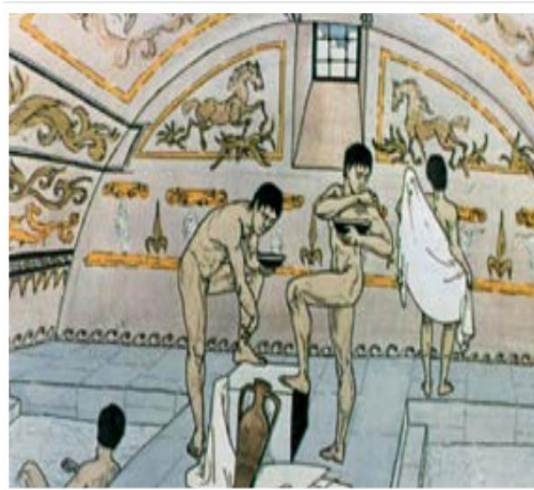
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Ancient Uses of Olive Oil



Roman bathers rubbing their bodies
with olive oil in the thermal baths



IPEPO-SNO (OLIVAE), Web:
www.internationaloliveoil.org, ISSN: 0255-996X

Ancient olive lamp



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Woman spinning wool. Detail from an Ancient
Greek Attic white-ground oinochoe, ca. 490
BC, from Locri, Italy. British Museum, London



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LIVINGAGRO **Traditional Olive Cultivation and Foraging in Olive Groves**

Olive agroforestry was an integrated system that combined livestock and olive oil production.

- Sheep were traditionally allowed to browse on the trees after harvesting in the winter and spring.
- Pigs only grazed the understorey grass and ate the fallen fruits, without browsing on the olive forage.

The plant species growing spontaneously in traditional olive groves were treated as pasture (any plant production [natural or artificial] that provides feed for the domesticated and/or wild animals, either as grazing or as forage) (Ferrer et al. 2001).

There are two kinds of pastures:

- Pasture of cover crops or spontaneous vegetation
- Pasture in abandoned olive orchards

The pasturing of sheep and goats usually happened after the olive groves were abandoned. Unregulated overgrazing eventually leads to a degradation of vegetation cover and consequently to an increase of fire risk and soil erosion.



Traditional Olive Cultivation and Foraging in Olive Groves

- After the olive harvest, sheep and goats can feed on the fruit left on the ground.
- The understory species are grazed mainly in spring.
- Olive forage is relished by cattle, sheep, goats and camels.
- Olive by-products are commonly fed to livestock.
- Pruning residues from small leafy branches are fed to animals or chopped and dried.
- Trees associated with olive agroforestry (such as fig, carob, and walnut) are also used to provide fodder for animals.
- In ancient times, flocks slept in the olive groves during the summer to help fertilize the trees.

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Traditional Olive Groves In Lebanon



- The presence of very old olive trees in Lebanon indicates their cultivation since ancient times.
- The tradition of olive cultivation continues to this day in many olive growing regions.





Traditional Olive Orchards In Lebanon

Olive cultivation in Lebanon differed from one region to another in terms of the growing system.



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In some regions, olive trees were organized in a monoculture groves. Other tree species were planted around those groves.



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In other areas, olives were planted in the same grove with other tree species such as fig, almond, and carob, as well as grapevines. This cropping system is now no long widely used.



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Traditional Olive Orchards In Lebanon

Most of the olive growing areas are mountainous, with moderate to steep slopes.

These steep lands were terraced with
stone walls.



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Traditional Olive Orchards In Lebanon

Many of the terraced olive orchards have been neglected over time for many reasons, the most important being the reluctance of the new generation of young people to pursue their cultivation and the high cost of restoring the terraces, which have been destroyed by severe climatic factors.

As a result, oak, pine and wild shrubs have invaded these neglected orchards and become part of the landscape of many forest areas.



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Traditional Olive Orchards In Lebanon



Farmers used to add a layer of soil 20-30 cm thick, usually white soil, around the trunk of the tree. This technique was used previously and is still in use today. The old farmer believed that this technique would increase the root biomass and thus the production. In fact, in addition to increasing the root system, this technique improves soil moisture retention and reduces summer temperatures.



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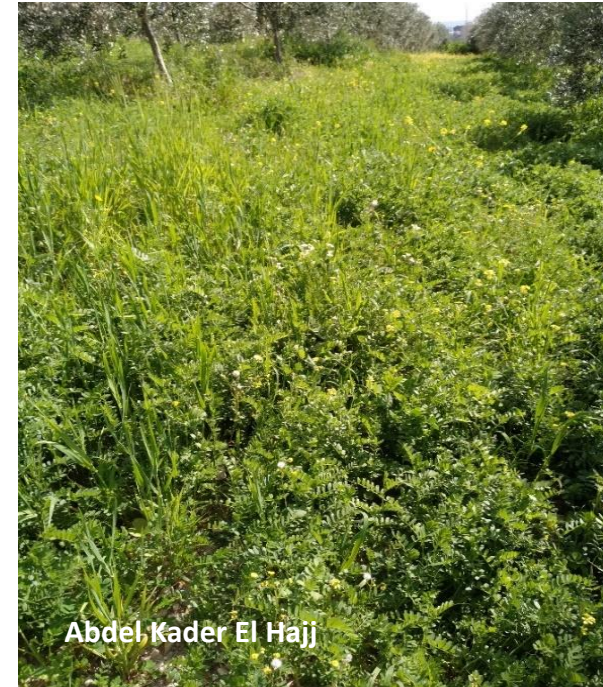
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Traditional Olive Orchards In Lebanon



- The soil of olive groves was plowed and left bare from late spring to autumn to prevent fires and facilitate harvesting.
- Barley and some legumes were planted in the fall and harvested as fodder for animals in the spring, while the remaining part after plant cutting was left for sheep to graze on.
- Olive farmers and ruminant farmers made a mutually beneficial exchange.
 - Ruminant farmers provided manure for olive groves in exchange for harvesting barley and legumes that were planted as cover crops in olive orchards.
 - Lentils, chickpeas, barley, and wheat were intercropped in olive orchards for their grain or legumes.
- ❖ **Many studies have found that incorporating legumes and grains into olive orchards improves soil fertility and provides a good source of forage for animal feeding and grazing.**



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Traditional Olive Orchards In Lebanon



- Soap, pomace and firewood are secondary by-products of olive orchards.
- Olive pomace was traditionally used by farmers to reduce the use of firewood in their stoves.





Traditional Olive Orchards In Greece



- In Greece, olive cultivation dates back 3500 years.
- Traditional land use was an agroforestry system in which farmers combined olive production with forest tree species and arable crops (vegetables, grains) on the same land (silvoarable agroforestry).
- Pastures or spontaneous vegetation were established under the olive trees for grazing by livestock (silvopastoral agroforestry).
- A more complex agrosilvopastoral system was created when olive groves were grazed after cereal crops were harvested.
- In these systems, the pruned olive branches were used as fuel as well as for feeding animals.



["Olive grove with poppies"](#) by [Nicholas Turland](#), [flickr](#) is licensed under [CC BY 2.0](#)





Traditional Olive Orchards In Greece



- The olive is the most widely cultivated tree in Greece.
- Almost 15% of all olive groves consist of agroforestry systems with crops or pastures.
- Olive trees are usually planted in rocky areas with soils mostly derived from hard limestone.
- The steep terrain under the olive groves is sometimes terraced with stone walls to prevent soil loss.
- Carobs (primarily in Crete), almonds, walnuts, apricots, figs, poplars, and plums are occasionally grown alongside olive trees or along the boundaries of olive orchards.



["Village of tsichlopigado"](#) by [Nicholas Turland](#), [flickr](#) is licensed under [CC BY 2.0](#)





Traditional Olive Orchards In Greece



- Olives are traditionally propagated through the grafting of wild plants.
- Edible olives and olive oil are the main products, while secondary products include animal feed and firewood. In some places, high quality furniture and handicrafts are made of olive wood.
- Many of the olive trees are estimated to be more than 200 years old.

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Traditional Olive Orchards In Greece



Olive trees have been grown with

- ✓ Animals (sheep, cattle, goats, honey bees, pigs or chickens). Animals graze primarily on spontaneous vegetation or some planted cover crops, with the exception of wheat and barley.
- ✓ Cereals, corn, alfalfa, grapevines
- ✓ Vegetable and fruit crops (melons, beans, onions, fava beans, potatoes, tomatoes, beans)
- ✓ Wild herbaceous vegetation, including some edible plants (such as common purslane, *Portulaca oleracea*) and medicinal plants (including devil's thorn, *Tribulus terrestris*)



Common purslane

"Common Purslane" by [Ingeborg van Leeuwen](#), [flickr](#) is licensed under [CC BY 2.0](#)

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Devil's thorn

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Traditional Olive Orchards In Italy.



- Olive tree is the most widely grown tree in Italy (1.16 million ha), (FAOSTAT 2016) and its cultivation dates back millennia.
- In Italy, agroforestry systems represent 0.4% of the total territorial area.
- Most of the agroforestry area (85%) is based on permanent tree crops such as fruit trees, tree nuts and olives.
- Olive agroforestry systems in Italy remained unchanged for centuries.
- Traditional olive agroforestry is often abandoned as older farmers retire, small producers do not find it worth the effort, and the hostile physical environment where it has generally been practiced (steep slopes, terraces, and unfertile soils) creates discouraging difficulties.
- The land under olive plantations were often terraced and cleaned of spontaneous shrubs to make way for crops.



"Italy - Tuscany - Vinci - olive groves" by [Mike Finn](#), [flickr](#) is licensed under [CC BY 2.0](#)

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Traditional Olive Orchards In Italy



- Large number of tree species (*Ceratonia siliqua*, *Juglans*, *Prunus dulcis*, *Ficus carica*, *Sorbus domestica*, *Morus alba*, *prunus*, *pyrus*), different oak species, shrubs (*laurus mobilis*, *Punica granatum*) and many herb species are associated with olive plantation in many olive growing areas.

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Traditional Olive Orchards In Italy



- Traditionally, olive trees have been intercropped with cereals and legumes, forages, and even vines.
- When orchards were not intercropped, their understory was utilized as pasture for animals that provided fertilization and weed control.
- As an evergreen species, olive trees also provided forage after pruning.
- Traditionally, olives were cultivated in association with:
 - Permanent horticultural crops such as almonds, carob, pears, and grapevines
 - Forage and grain species
 - Forest trees, frequently oaks (*Quercus* spp.)



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Traditional Olive Orchards In Italy (Calabria Region)



- Traditional structural traits of olive agroforestry:
 - Low tree spacing (< 250 plants per hectare [ha]), low yield.
 - Low agronomic input requirements: absence of irrigation, low degree of mechanization, manual harvest
- Olive-based polycultural agrosystems:
 - Olive groves mixed with vineyards at moderate altitudes
 - Olive groves mixed with citrus groves at lower altitudes
 - Mixed cropping systems: olive-based agroforestry systems at various altitudes
- In addition to economic benefits, these agrosystems play the following roles:
 - Help reduce the risk of landslides and wildfires
 - Assist in agricultural management on steeper slopes
 - Contribute to the preservation of landscape quality

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Current Status of Traditional Olive Orchards In Sicily, Italy



- Olive trees have been widespread since ancient Greek, Roman, and Arab times.
- Olive agroforestry systems are found in difficult environmental conditions and in mountainous non-mechanizable areas.
- Agroforestry systems have been abandoned in large parts of Sicily in recent decades.
- The abandonment of Sicilian agroforestry systems was accelerated by several factors:
 - Low income of farmers
 - Land fragmentation
 - Depopulation of rural areas
- In Sicily two silvopastoral systems are found:
 - Olive trees are commonly found in hilly zones along with wild herbs and shrubs that are grazed regularly after fruit harvesting.
 - Olive trees grow with *Quercus* ssp. (oak) woods that are frequently overgrazed.

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Current Status of Traditional Olive Orchards In Sicily, Italy



Several olive agroforestry systems are found in Sicily

➤ Olives with horticultural crops

- This system is linked to self-sufficient family production.
- The herbaceous component of this system (nitrogen-fixing species such as broad beans, peas and chick-peas) is grown to meet the needs of the farmer's family.
- Sage, thyme, oregano, potatoes, tomatoes, onions, and garlic are also cultivated in this system.
- Production and protection (including continuous maintenance of the terraces) are the prevailing functions of these systems.

➤ Olives with *Prunus amygdalus* (almonds)

- This system is found on slopes and covers large parcels.
- Almonds predominate over olives.
- Olive trees are distributed unevenly within the parcels.
- Fruit production is the primary goal of this system.





Current Status of Traditional Olive Orchards In Sicily, Italy



Several olive agroforestry systems are found in Sicily

➤ Olives with *Vitis vinifera* (vines)

- Olives and vines are grown in small parcels to fulfil the needs of the farmer's family.
- The large crown of the olive tree in this system reduces evaporation from the soil surface and protects vines from winter frost and strong winds.

➤ Olives with grain for forage

- Olive trees are present in low densities (15 trees per ha).
- Olive trees are scattered irregularly within the forage crop.
- This system also includes downy oak, almond, and carob trees in addition to olive trees.
- The herbaceous component provides both fresh grass and hay, ensuring that livestock are fed year-round.
- Plant species used as forage are oats, barley, and common vetch.
- The plant cover of the forage species provides an important soil-protective service in this system.

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Current Status of Traditional Olive Orchards In Sicily, Italy

Several olive agroforestry systems are found in Sicily

- **Olives on volcanic substrate with *Quercus suber* and *Q. pubescens* s.l. (oak trees)**
 - Animals, mainly bovines, pigs, and horses, graze on spontaneous vegetation and on *Quercus* in these systems from November to May.
- **Olives on limestone substrate with *Quercus pubescens* s.l. and *Q. ilex* (oak trees)**
 - The components of this system are oaks, olives, domestic animals, and other crops such as pears or cereals.
 - In this system olive trees predominate over oak. Oak trees provide shelter and acorns for grazing animals.
 - Spontaneously growing *Olea europaea* var. *sylvestris* (wild olive) trees have often been used as rootstock for grafting.

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Traditional Olive Orchards In Morocco



- The olive tree was introduced to Morocco by Phoenicians who settled on the Moroccan coastlines.
- Moroccans had been familiar with wild olives for a long time before that.
- Olive domestication by grafting Oleasters (wild olives) was used by Berber groups in northern Africa before they were colonized by the Romans.
- Olive agroforestry was then created by grafting wild olives (Oleasters) that were naturally scattered in border areas between forests and agroforestry.
- The first agroforestry consisted of pasture lands based on a rotation between cereals, pulses and fallow periods.



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Traditional Olive Orchards In Morocco



- Olive cultivation was further developed during the Roman era.
- Olive orchards now account for around 55% (740,000 ha) of all cultivated land under fruit trees in Morocco, giving them a major socioeconomic significance.
- The olive tree is still grown along with fruit species (fig, carob and grapevine) that play an important role in the domestic economy.
- Olive agroforestry has traditionally included annual arable crops, mainly cereals (durum wheat, bread wheat, barley), legumes (fava beans, lentils, chickpeas) and forage.
- Cows, sheep, goats, chickens, and mules graze in this agro-ecosystem.

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Traditional Olive Orchards In Morocco



Under the influence of Roman civilization, olive products were used in a variety of ways in Morocco:

- As food
- As fertilizer and insulation (pomace and by-product oils)
- To make ointments and other treatments in pharmacies
- For lighting

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Current Status of Traditional Olive Orchards Western Crete (Greece), Cordoba, Granada & Jaen (Spain), Basilicata & Salerno (Italy), Trás-os-Montes (Portugal)

- Slope: Moderate to steep slopes
- Tree age: > 50 years
- Planting pattern: Regular
- Tree density: Low density: 50 -150 trees/ha
- Cultural practices
 - Pruning: once every 3 years. Tillage: None, or 2/year. Fertilization: Chemical, Chemical + organic. Pest control: None, or 2/year. Weed control: Chemical, tillage, grazing (Crete & Cordoba). No irrigation. Production: 800 - 2100 kg/ha
- Farm size: Small
- The practice of keeping a cover crop (natural or sown) during the rainy period of the year in order to prevent erosion is fairly recent in these traditional olive orchards.



Current Status of Traditional Olive Orchards Western Crete (Greece), Cordoba, Granada & Jaen (Spain), Basilicata & Salerno (Italy), Trás-os-Montes (Portugal)

Agro-socio-economic aspects:

- Traditional olive farmers tend to be small producers, with less than 10 ha and often no more than 2 ha of olive orchard.
- The main sources of income for most farmers are off-farm activities (salaries from services) and pensions.
- The farmers are usually approximately 50 years old, or older.
- Many traditional olive farmers continue working in their olive groves for sentimental and cultural reasons, despite low economic returns from these agricultural systems.
- The majority of the olive groves were acquired through inheritance.
- The combination of traditional olive cultivation with other crops (perennial or annual) and animals compensates for the low income of olive cultivation.
- There is a weak relationship between traditional farmers and the market.
- Rural depopulation has a direct negative impact on the availability of labour.





Current Status of Traditional Olive Orchards In Lebanon

- The majority of olive groves are cultivated in a traditional manner, and they stretch from north to south and from the Mediterranean coastline up to 2,000 meters above sea level, playing an important part in the landscape, along with the other agricultural and forest lands.
- Olive groves cover almost a quarter (23.5%) of the agricultural land in Lebanon.
- Olive and olive oil production accounts for about 10% of total agricultural output.
- The majority of olive groves are rain-fed, since most of them are located in regions with limited access to irrigation.
- Despite the detrimental impact of excessive land fragmentation on production costs, olive farming nonetheless meets the demands of farmers and generates an extra small profit, especially the year on (high load of fruit).
- About 77% of olive oil producers in Lebanon are small growers with olive orchards of less than 5 dunums (0.5 ha). Larger orchards (groves larger than 10 dunums, or 1 ha), are owned by large families, religious institutions, or major oil bottlers and traders; these account for 9% of Lebanese olive oil farms.

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Current Status of Traditional Olive Orchards In Lebanon

Major challenges facing the olive sector in Lebanon

- Low yields: The overall production of Lebanese olive oil orchards (1.9) is lower than the average of several European countries (Italy 2.7 tons, Spain 2.4 and Greece 2.1 tons per hectare).
- High production cost, mostly due to the high labor cost for manual harvesting.
- Pruning is difficult due to a lack of knowledge and access to proper equipment.
- Many olive groves receive little attention and in many cases are managed not by the owner but by specialists (wood damans” who perform technical work) in olive growing.
- Excessive land fragmentation is a major challenge in olive oil production.
- There are not enough agricultural cooperatives to help address the primary problems of the olive sector, such as land fragmentation and high production costs.
- As a result of population growth, small olive groves are prone to abandonment:
 - Replacing olive groves with more profitable crops.
 - Many municipalities’ efforts to reclassify land use from agricultural to residential and urban encourages many farmers to be involved in the construction of commercial housing complexes in their olive groves.

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The Economic Importance of Olive Agroforestry

For centuries, olive cultivation has played a significant economic role in many olive growing countries:

- The olive-growing area in the Mediterranean covers 9.42 million hectares.
- Mediterranean countries produce approximately 2.77 million tons of olive oil each year.
- Olive cultivation contributes to higher employment and the conservation of natural resources.

Despite these facts, sentimental and cultural reasons rather than economic ones are the main drivers that induce farmers to continue working in their olive groves.

Traditional olive agroforestry is characterized by small farms that are inherited from generation to generation. Farmers in the olive growing areas are generally middle aged to elderly. Given their small olive farms' low productivity and generally negative economic returns today, farmers do not tend to depend on olive cultivation for their livelihood, but rather on other income.

However, olive agroforestry offers ways to make olive growing more profitable.

The Economic Importance of Olive Agroforestry

Agroforestry is commonly associated with three broad economic benefits:

- Reducing fixed costs per output, as the same equipment is used for more than one purpose (for example, maintaining an orchard, field, and pasture)
- Reducing the length of time before land becomes productive (for agroforestry, vs. exclusive tree production)
- Diversifying income sources

As the following slides will show in more detail, **agroforestry can offer even more economic benefits:**

- Diversification of local products and economies through long-term and short-term production schedules and local sales of products
- Improved food and fuel security through use of agroforestry by-products, a reduced need for agrochemicals, and increased local self-sufficiency due to diversified local production
- Cultural and biological improvements to the environment related to increased visual appeal and potential agrotourism activities
- Ecosystem services that indirectly reduce the cost of production (for example, by decreasing the need for chemical pesticides and fertilizers)
- Creation of jobs in multifunctional agriculture and diversification of rural skills



Traditional agroforestry improves the economic stability of communities



➤ Diversification of local products and economies

- ✓ Long and short-term income is obtained from both trees and annual crops or livestock (for annual and periodic revenues)
- ✓ Agroforestry can yield a variety of products: fruits, grains, vegetables, fodder, forage and wood
- ✓ Selling agroforestry products locally boosts the local economy
 - Reduces the price of products by reducing the cost of transportation
 - Helps revive the local economy by keeping money in the community

➤ Improved food and fuel security

- ✓ By-products of the agroforestry system (pruned wood and olive pomace) can reduce the use of fossil fuels for heating and cooking
- ✓ The enhanced nutrient cycle and pest and disease control of agroforestry systems can reduce the need for oil-based agrochemicals
- ✓ Localized production of multiple outputs can avoid the need for long-distance transportation of goods and therefore reduce fuel use





Traditional agroforestry improves the economic stability of communities



- **Landscape diversification and improvements to the environment (cultural as well as biological)**
 - ✓ Valued for their visual appeal, traditional agroforestry systems can convert marginal areas into attractive diversified landscapes
 - ✓ Activities such as hunting, fishing, birdwatching, mountain biking, equestrianism and rural tourism can provide alternate income sources for farmers, while the public can benefit from improved health and enjoyment
- **By increasing soil fertility and creating a balanced ecosystem**, agroforestry can reduce pesticide and fertilizer use, thus indirectly **reducing the cost of production** as well as cutting down on pollution
- **Creation of employment by multifunctional agriculture that requires a diverse set of rural skills:** pruning, grafting, fertilizing, marketing, pest and disease control, building a drainage system, and designing agroforestry systems.

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Policies

Despite the **many benefits of agroforestry**, limited awareness among farmers and landowners, lack of supportive aids and policies, and changes in land use act as **barriers to the more widespread adoption of agroforestry**.

To incentivize farmers to get involved with agroforestry, **it is essential that appropriate policies for the development of agroforestry be established**. Spontaneous agroforestry without conservationist policies could lead to the decline of this agricultural system.

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Policies

- Agroforestry initiatives are restricted by
 - Bureaucracy
 - Land ownership
 - Lack of knowledge about the advantages of agroforestry
 - A substantial waiting time for some of the visible benefits

- Policy challenges:
 - Emphasis on monoculture food and forestry
 - Emphasis on industrial agricultural crops
 - Emphasis on mechanized farming (often subsidized), discouraging the integration of trees into farmland



Policies

Although many challenges remain, Europe has made great strides in developing and protecting agroforestry through the enactment of legislation and consolidation programs.

- In Italy (Apulia region) landscapes formed by olive trees are protected by law:
 - Regional Law 144 dated 14 February 1951 (Arts. 1 and 2 Legislative Decree 475/27.7.1945)
 - Regional Law 14 dated 4 June 2007 (Uff. Bull. Reg. Puglia no. 130, 18 September 2007). This law forbids damaging, cutting down, uprooting or selling monumental olive trees.
- In France, agroforestry has been permitted since 2002 as a standard practice for French landowners and farmers.
 - Grants are available for planting trees, and crop payments are available for intercropping, on a “cropped area basis.”
 - A farmer who manages an agroforestry plot may apply to participate in an agri-environmental scheme designed to promote agroforestry by compensating farmers for additional costs incurred due to agroforestry, compared to a standard agriculture plot.



Policies

- **Agroforestry enjoys EU-level recognition and support through the common agricultural policy (CAP).**
 - Farmers can receive direct payments per hectare of land under agroforestry, as well as support for the establishment or maintenance of agroforestry systems under the rural development strand of the CAP.
 - Innovation and research in this field can also be supported.
- **The European Parliament has recognized the benefits of agroforestry** in several resolutions and called for more effective support for a range of sustainable production methods, including agroforestry.

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Policies

- Graves et al. reported on the results of a **survey of European farmers' perceptions of agroforestry**, which suggest agroforestry has the potential to become a more common land use system across Europe.
 - Only 33 percent of respondents correctly defined agroforestry as an association of trees with crops or livestock.
 - Half of all the participating farmers indicated that they would be willing to attempt silvoarable agroforestry on part of their farm.

- A guideline promoted by the **Food and Agriculture Organization of the United Nations (FAO)** suggested four main critical conditions that encourage agroforestry:
 - It should be beneficial to farmers and other land users
 - There must be security of land tenure
 - Intersectoral coordination is essential
 - Good governance of natural resources is crucial



Policies

- ❖ **The AGFORWARD (AGroFOREstry that Will Advance Rural Development) research project** (January 2014-December 2017) funded by the European Commission is **promoting agroforestry practices that will advance sustainable rural development in Europe.**

The project has four objectives:

- ✓ Understanding the context and extent of agroforestry in Europe
- ✓ Identifying, developing and field-testing innovations (through participatory research) to improve the benefits and viability of agroforestry systems in Europe
- ✓ Evaluating innovative agroforestry designs and practices at a field-, farm- and landscape scale
- ✓ Promoting the wider adoption of appropriate agroforestry systems in Europe through policy development and dissemination

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Policies

In Lebanon, agroforestry is a relatively new concept; agricultural policies primarily focus on forests and a few important crops.

However, in response to growing environmental concerns, the Ministry of Agriculture, in collaboration with local and international institutions (EU), has recently launched several programs aimed at mitigating environmental degradation.

Most of these programs have been limited to some good agricultural practices.

Agricultural policies must be directed towards enacting legislation that strengthens agroforestry systems.

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