

ECOLIVE

**ECOLIVE
TRAINING FOR THE
PRODUCTION OF
ORGANIC OLIVE OIL**



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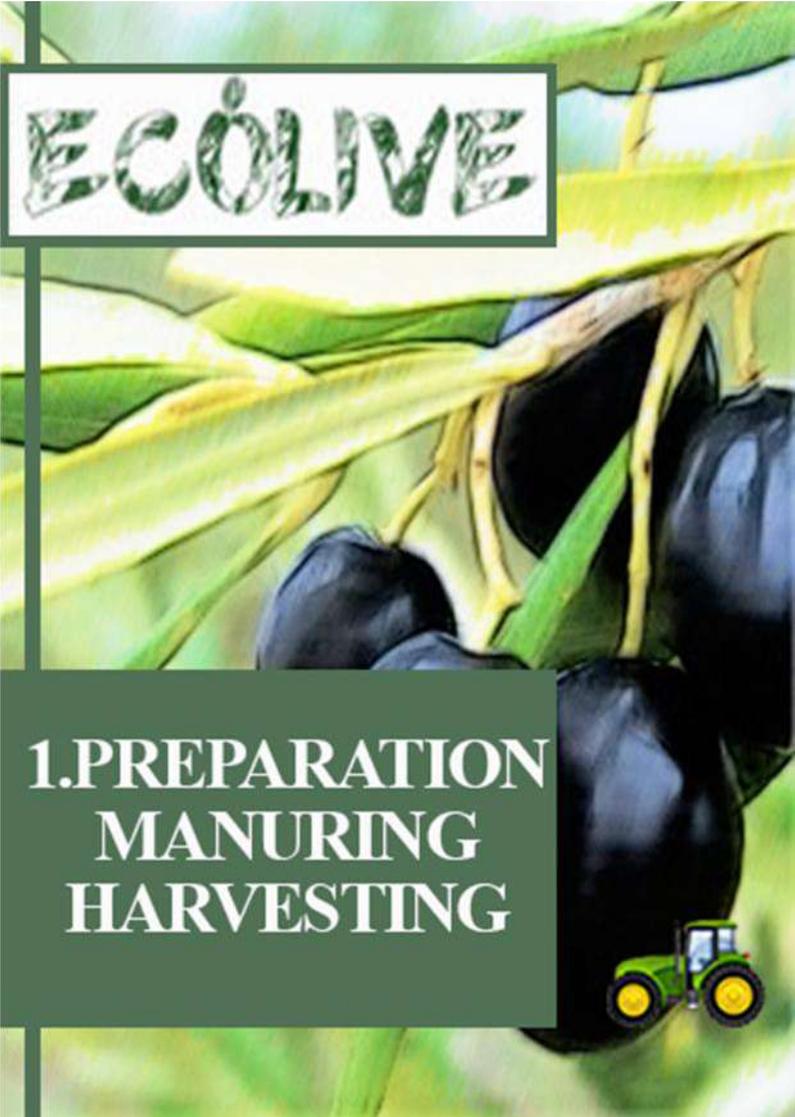
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A close-up photograph of an olive branch with several dark, ripe olives and green leaves. A small green tractor with yellow wheels is positioned at the bottom right of the image, partially overlapping the olive branch. The entire image is framed by a thin green border.

ECOLIVE

**1. PREPARATION
MANURING
HARVESTING**

1.1 INTRODUCTION

1.1.1 GENERAL INFORMATION AND ENVIRONMENT CONDITION

The olive tree (*Olea europaea* L.) is one of the most representative plants in the Mediterranean area and the only one with edible fruit between about 30 belonging to the genus *Olea*. Olive trees, originally from Caucasus (Iran), Mesopotamia and Palestine, have been progressively spread all around the Mediterranean area thanks



Figure 1-1 Sicilian organic olive oil

to the expansion of commerce and domination of the Phoenicians, Carthaginians, Greeks and Romans throughout the centuries. Nowadays it is one of the most ancient cultivated arboreal species worldwide and the most important in the Mediterranean area, which comprises 95% of the cultivated area.

Since then, the olive has been introduced to the rest of the planet, nearly in all climatically compatible countries, between 30° to 45° North and South latitude, characterized by a temperate-warm climate, with long and dry summer seasons: such as Americas (United States, Mexico, Peru, Chile, Argentina), Oceania (South Australia), Southern Africa (South Africa), Asia (India) up to the extreme east (China, Japan).

The olive is a diploid species with 46 chromosomes ($2n = 2x = 46$), even though there are some cases of plants triploid and tetraploid. Olive tree is an evergreen plant, mainly allogamous and vegetatively propagated, which shows high tolerance to drought and salinity, as compared with other fruit tree species. The olive tree is the second most important oil crop in the world after oil palm with ten million hectares cultivated surface, concentrated in the Mediterranean, where it is consumed 70% of the olive oil that has been produced.

The ancient origins of the olive trees cultivation, as well as the ease in the propagation have led to the presence of many cultivars worldwide. The wide intraspecific genetic variability, that might be found in olive, is due to the biological characteristics, such as the presence of allogamy and flowering self-incompatibility, whereby the high levels of cross-pollination leads to the presence of heterozygosity. The olive tree has a gene pool very large, the result of different gene mutations and spontaneous crossings that have taken place over centuries.

According to reports from Bartolini (<http://www.oleadb.it>), about 1,250 varieties have grown in 54 countries and stored in more than 100 collections, including the database of olive germplasm FAO; although most likely due to miss information regarding local varieties and unknown ecotypes, this number may certainly be higher. Those cultivars are mostly located in the Southern Europe countries: e.g. Italy has the highest biodiversity olive, counting more than 600 varieties; following Spain with 183 varieties, third Turkey with 89 different accession, France 88 and Greece 52. The Italian production is characterized by the presence, in the main crop of 148 cultivars, but, as mentioned above,

there are well over 600 different genotypes ascribe some of which have limited geographical distribution. The fragmentation of the landscape Italian olive oil is not only determined by the old age tradition that olive growing plays in our country and the particular edaphic conditions, but also by the tormented history of our country, divided into a myriad of states until the second half of the nineteenth century. Moreover, there are few synonyms and homonyms between different cultivars, which have been not completely clarified with studies of molecular characterization of germplasm. In addition, the Turkish national olive gene bank has 89 genotypes and all are evaluated and described by molecular techniques. In 2012, the third replicate after Spain and Morocco of the International Olive Oil Council gene bank is initiated in Izmir.

The economic and commercial importance of the olive tree is in continuous expansion due to oil olive and table olives, which demand has been strongly increasing, have been appreciated and recognized for its excellent nutritional and nutraceutical value. The extravirgin olive oil constitutes also an important element of the Mediterranean Diet thanks to its organoleptic characteristics and its contribution to a healthy diet.

1.1.2 OLIVE OIL'S ECONOMICAL IMPORTANCE

Olive cultivation, as well as extravirgin olive oil production, is of considerable interest to both the rural economy and the environment. According to the report of the IOC (International Olive Oil Council), the Mediterranean countries represent 95% of the olive growing worldwide, estimated in 10 million hectares. All over the world the number of olive trees has increased to 800 million, mostly for the production of oil (about 90%) and the rest for growing table olives; it is estimated that more than 2,500,000 tons of olive oil are produced every year

The European Union holds the world record both for the production of table olives, which reaches 32%, and for both the production and the consumption of the olive oil thanks to 2.1 million tonnes of oil product; Spain is the world leader in the olive oil sector with an average production (2008-2014) of 1.3 million tonnes of olive oil, followed by Italy, in second place, with 450,000 tons, and Greece with 285,000 tons of oil product; Finally, other European countries like Portugal, Cyprus and France contribute respectively with 67,500, 5,200 and 5,300 tons. As for non-Community producing countries Syria, Tunisia, Turkey, Morocco, Algeria and Palestine, are those that are characterized by the quantity and quality of production. However, the recent expansion of the olive sector in the areas of new cultivation, such as Australia and the United States, is contributing to greater market stabilization extra virgin olive oil.

Country	Average from 2002-03 to 2007-08	%	Average from 2008-09 to 2013-14	%	Increment %
Spain	1072.9	50.2	1305.4	61.7%	17.81
Italy	639.1	29.9	447.7	21.1%	-42.75
Greek	379.7	17.8	285.1	13.5%	-33.18

Portugal	35.1	1.6	67.6	3.2%	48.08
Cyprus	6.8	0.3	5.2	0.2%	-30.77
France	4.4	0.2	5.3	0.3%	16.98
Other UE	0.3	0.0	0.5	0.0%	40.00
Total	2138.3	100.0%	2116.8	100.0	2.31

Table 1-1 Average for Country amount of olive oil. (Source: IOC). Amount media per Country about extra virgin olive oil produced (Source: COI)

Following the importance of the olive sector, linked to difficulties in sustaining competitive production of non-EU countries are characterized with lower production costs, the European Union has enacted specific measures and Community regulations in order to protect the oil olive oil, with regulations regarding the classification of oil (Reg. EC no. 1989/03), the marketing and labelling (1019/2002) and the establishment of protection of trademarks as PDO (Protected Designation of Origin), PGI (Protected Geographical Indication) and TSG (Traditional Speciality Guaranteed) (2081/92 and 2082/92), in addition to provide grants and supplements the income of growers.

Italy has an olive heritage priceless, with about 600 cultivars holds the record for number of varieties accounting for 25% of world olive germplasm. This diversity, combined with the ancient cultural tradition

and culture of this species, is, therefore, one of the values of fine Italian olive; each variety, inseparably linked to a particular territory, expresses sensory properties and organoleptic diversified, becoming an element of the local culinary traditions. These production characteristics have allowed Italy to be able to apply for recognition of 37 PDO and PGI, becoming the country most representative at Community level for the number of awards of origin.

1.1.3 AGRICULTURAL ASPECTS

The olive is a perennial, long-lived, evergreen and rustic tree, very resistant to drought, and capable of also living in marginal soils. Nevertheless, as for all arboreal fruit plants, the expression of the productive potentialities depends on the satisfaction of the physiological necessities in terms of environmental habitability, such as climate, soil, water and nutritional availability and phytosanitary conditions. All of these factors must be considered and harmonized in modern olive growing management, to achieve the best cultural responses, in terms of both income and environmental sustainability.

1.1.3.1 Thermal Demands

High temperatures do not penalize the vitality of the plant, provided that there is no lack of water. The olive is instead more sensitive to frost: during winter dormancy, the tree can tolerate temperatures up to -5 °C while temperatures ranging between -5 and -10 °C may cause greater damage to shoots and young limbs, which may lead to their death. Temperatures below -10 °C kill large limbs and even the entire canopy of the tree and also the trunk. Higher frost, however, usually does not jeopardize the vitality of the stub, from which the plant can reconstitute itself with the suckers produced by the gems of the stub ovules. The thermal equivalents, in the phenological phases of the annual biological cycle, are reported in Table 1-2.

Table 1-2 Thermal equivalents in the phenological phases of the olive biological cycle (*Olea europaea* L.)

from vegetative resumption to blossoming buds	10 °C
from blossoming buds to flowering	15 °C

from flowering to fruit set	18 °C
from fruit set to veraison	20 °C
from veraison to ripening	15 °C
from ripening to winter dormancy	5 °C
from winter dormancy to vegetative resumption	- 5 °C

1.1.3.2 Water Demands

The olive is a species with a high degree of drought tolerance, capable of growing and producing a yield under prolonged summer water shortage, by means of physiological, biochemical and morpho-anatomical responses to reduce water loss and tolerate dehydration. However its capacity to withstand severe and prolonged drought periods, causes reductions in photosynthetic performance and elaboration of assimilates, that negatively act on olive growth and productivity. Olive tree water demands vary and depend upon factors such as soil type, climate, plant density, age of trees, cultural management (i.e. fertilizing, pruning) and watering system. The olive nevertheless has some critical periods during the annual cycle, in which the plant mostly needs water. The first one extends from bud differentiation up to flowering and therefore to the fruit set; in these phases a water deficit can create problems with regards to flower development with a smaller number of flowers for inflorescence, increasing ovary abortion, and a lower fruit set. Rainfall during the flowering period may cause significant reduction in fruit set. Subsequently, the first phase of fruit growth is the most

sensible to drought, while at the pit hardening period, the olive is most resistant to water deficit. Finally the olive needs water in the second phase of fruit growth and during the inolition.

1.1.3.3 Ground Demands

The soil is a non-renewable resource that supports and conditions the life of animal and vegetal species. It is composed by solid mineral particles of different sizes, and variable percentages of organic matter, bound together into structural aggregates to constitute different soil typologies.

Soil also acts as a storage of elements, and its structural arrangement is directly correlated to the availability of nutrients and water; and consequently to the plants' development and yield.

The textural class is the first parameter that defines soil properties, and is determined by the relative percentage of the three major soil mineral compounds: clay, silt and sand.

Clayey grounds are characterized by particles of a diameter of less than 0.002 mm; these soils have a low porosity and water permeability that can induce root asphyxia phenomena in wet conditions; while in the dry state they show a high tenacity, and tendency to form cracks.

Silty soils have elementary particles of diameter between 0.02 and 0.002 mm, of low structural stability and high bulk density, which involves formation of mud in wet conditions, and pulverization when in dry state.

Sandy soils have particles of a diameter between 2 and 0.02 mm, with high porosity, high water permeability and air circulation; consequently, these soils have low capacities of water-holding and fast mineralization of organic matter.

Soil textures with balanced proportions of clay, silt and sand, in presence of sufficient quantities of organic matter, constitute better structural aggregates, with optimal porosity, water and nutrients availability, that are the parameters directly correlated to the levels of “physical”, “chemical” and “biological” fertility of agrarian soils.

Even though the olive tree prefers deep loam textured and well drained soils, with adequate management of cultural techniques it can grow in various kind of soils, from alluvial plains, to terraces, to slopes, and shallow and marginal soils, in arid and semi-arid areas. According to the different environmental conditions and technological level of management, different olive-growing typologies correspond, from extensive olive orchards, with 100 or less trees ha⁻¹ (Figure 1-2), up to the modern super intensive plantations, with 1200 to 1600 trees ha⁻¹ (Figure 1-3). The most common Italian specialized olive-orchards are scaled between 6x4 (416 trees ha⁻¹) and 6x6 (277 trees ha⁻¹).



Figure 1 2 High density olive – orchard (super-intensive system)



Figure 1 3 Traditional olive orchard

1.1.3.4 Nutritional Demands

In profitable olive growing, nutritional demands vary in relation to phenological phases, to climate, to orchard typology, to the trees' productive potentiality and the presence of other cultural techniques, such as soil grassing and irrigation. For these reasons, fertilization planning cannot be approached as a standard procedure. In every cultural situation, the purpose is to realize a correct balance between the vegetative and productive activity of trees. Plants are constituted for 96% by carbon, hydrogen, oxygen and nitrogen; and in a smaller quantity, by potassium, phosphorus, calcium and magnesium; in the least part by iron, manganese, boron, copper, zinc and chlorine. These elements, distinct in macro- and microelements, are present in the soil in

ionic or complex form in the circulating solution and are absorbed, moved and metabolized by the plants.

1.1.3.5 Training Systems

The training system is, with the choice of the cultivar and tree spacing, the third essential parameter in creating a new olive orchard, and is based on cultural objectives and environmental limitations. In modern Mediterranean olive orchards, the most common shapes are:

- Vase - with several variants as cone, cylinder, multiple cones, the vase is the most common shape in intensive specialized olive-growing. Usually the vase has a single trunk of about 80 to 100 cm height, branching into 2 to 4 primary branches, equally spaced and tilted about 45 to 50 degrees, from which the secondary branches develop, that generate shoots and twigs, to constitute the canopy.
- Vasebush- is a vase without a proper trunk, and with primary branches originating from the root-suckers of the stub, and secondary ones arranged similarly to the vase.
- Globe - is a shape with a single trunk and a globular canopy; it differs from the vase in the center of the canopy that is occupied by vegetation.
- Single Trunk Free Canopy - all systems that require little or no pruning are included in this shape, combining the features of a single trunk with low cost and flexibility of minimum pruning.
- Bush - is a free canopy system obtained with minimum pruning during the training phase, as well as on mature trees, allowing the canopy to grow as free as possible, so that the final shape is similar to naturally growing plants.

- Monocone- in this shape, the primary branches are inserted in a spiral on the trunk, that constitute the central axis of the tree, with length decreasing from the base to the top, and fruiting shoots uniformly distributed on the external edge of the canopy, resulting in a conical shaped tree, that is suitable for full mechanization in high-density orchards.
- Hedgerow - is a training system in which trees grow freely, usually on a single- trunk vase bush or monocone-like, so that the canopy forms a productive wall along the row. This shape is the most suitable for full mechanization in common intensive orchards (6x4 to 6x6 scaled), using mechanical pruners and continuous wall-harvesters.

1.2.ORGANIC AGRONOMIC TECHNIQUES AND ORCHARD MANAGEMENT

In organic olive-grove management, the cultural techniques and their correct application are essential to exalt the productive potentialities of the plants, preserve the environment and maximize profit. They can be distinguished in: soil practices, directed to preserve and improve soil conditions and tree practices, directed to plant growth and yield.

The organic olive fruits production is possible in different types of olive groves:

- a) Olive grove in organic farming - first harvest can be certified;
- b) Conventional or integrated olive grove converted to organic farming – must undertake a conversion period of three years.

In this conversion period, all organic farming rules must be fulfilled, although the final product (olives or olive oil) cannot be marketed as

such. This is the most difficult period for the producer, which requires more support, both technical and financial.

In organic farming, intensive production systems are allowed, since soil is used, rather than hydroponics techniques. Nevertheless, highly intensive systems are difficult to apply as it does not match some organic farming principles: priority use of farm resources; maintenance and improvement of soil fertility; natural pest limitation instead of phytosanitary treatments; disease's prevention through prophylactic measures, such as tree density not causing excessive shading. To match these principles, a maximum of 300 trees per hectare is accepted as common for an organic olive grove (Fig. 2-1).



Figure 2 1 Semi-intensive olive grove, with 300 trees per hectare and covered soil to prevent erosion.

1.2.1 SOIL PREPARATION AND MANAGEMENT

Avoiding the use of forbidden fertilizer or pesticide is not enough to assure organic farming. To achieve this, farmer must use practices and techniques to maintain and improve soil's fertility. This is a basic principle, which must also be evaluated by the PCB, which is not always the case.

The installation and maintenance of a new olive grove, requires the following principles and practices:

- soil must be evaluated until 1 meter depth at least in order to identify the main fertility aspects, which requires the opening of profiles to observe and collect samples for analysis;
- the soil must be mobilized in depth (about 1 meter) without turning around the different layers, and in accordance with the observation made before, which is achieved through the practice of ripping, then pass with chisel, or tine cultivator or combined machine of spring-loaded tines with straw incorporated discs;



Figure 2 Combined machine of spring-loaded tines with straw incorporated discs to prepare the soil with fewer passes and less fuel and energy consumption

- before the olives trees plantation, soil must be cleaned out of weeds that are more difficult to combat without herbicides, particularly rhizomatous herbs, such as bermudagrass (*Cynodondactylon*(L.) Pers.), torpedograss (*Panicumrepens*L.), or other perennials, that are difficult to combat, such as sedge (*Cyperusrotundus*L.).
- soil fertility must be improved since the first year of plantation, through organic and mineral correction, when the main parameters of fertility are outside of the favorable values (Tab. 1). This can be done with an authorized organic corrector, preferably obtained by composting, and with a magnesium limestone (dolomite) or sea source limestone as the lithothamne;

Table 2-1Analysis of soil chemistry and physics - values and favorable conditions for olive

<i>Parameter</i>	<i>Favorable value</i>	<i>Favorable conditions</i>
<i>Soil depth</i>	<i>>0,8m</i>	<i>Arable soils with more than 1,20 meters are the most appropriate</i>
<i>Texture</i>		<i>Loam, silt loam, clay loam, silty clay loam</i>
<i>Drainage</i>		<i>Good drainage, without accumulation of stagnant</i>

		<i>water</i>
<i>pH</i>	5,5-8,5	<i>Optimal pH: 6,0-7,5</i>
<i>Salinity/ conductivity</i>	<2,7 dS/m	<i>With 4dS/m there is a decrease in production of about 10%; with 5dS/m, 25%; and with 8dS/m, 50%</i>
<i>Organic matter</i>	>1,5%	<i>Values below 1,5% strongly increases the risk of shortages and loss of fertility</i>
<i>Phosphorus oxide (P2O5)</i>	>25mg/Kg	
<i>Potassium oxide (K2O)</i>	>50mg/Kg	
<i>Calcium oxide (CaO)</i>	>100mg/Kg	
<i>Magnesium oxide (MgO)</i>	>20mg/Kg	
<i>Active lime</i>	<10%	

• *green manure is a main practice on the improvement of the soil. In the first year should be made an annual green manure made of, at least, one leguminous and one grass specie, according to the type of soil and climate (Tab. 2);*

Table 2-2Green manure – Autumn/winter consociations for olive grove for different soil types

Species	Seed (Kg/ha)	Soil
Oat + common vetch <i>Avena sativa + Vicia sativa</i>	100+50	tiny acid to slightly alkaline; loamy to clay
barley + common vetch <i>Hordeum vulgare + Vicia sativa</i>	100+50	neutral to alkaline; loamy to clay
barley + fababeans <i>Hordeum vulgare + Vicia fabavar. minor</i>	100+50	neutral to alkaline; loamy to clay
barley + common vetch + Persian Clover <i>Hordeum vulgare + Vicia sativa + Trifolium resupinatum</i>	50+40+10	neutral to alkaline; heavy and difficult to work
Oat + barley + common vetch + fababeans <i>Avena sativa + Hordeum vulgare + Vicia sativa + Vicia fabavar. minor</i>	50+50+25+25	tiny acid to slightly alkaline; loamy to clay
Rye + yellow lupin <i>Secale cereale + Lupinus luteus</i>	100+50	acid, sandy, loam and well- drained soil
Rye + common vetch <i>Secale cereale + Vicia sativa</i>	100+80	acid, sandy, loam and well- drained

		soil
Oat + yellow lupin <i>Avena sativa + Lupinusluteus</i>	100+50	acid, sandy, loam and well- drained soil
Oat + white lupin <i>Avena sativa + Lupinusalbus</i>	100+80	acid to neutral, sandy to loamy, well-drained

in organic farming, soil conservation is mandatory, avoiding all types of erosion, and water erosion in particular. The best practice to achieve thisgoal is by covering the soil, either with spontaneous vegetation (Fig. 2-3), or with specific cover crops adapted to soil and climatic conditions (Tab. 2-3);



Figure 2-3 Natural soil covering with spontaneous vegetation based on burclover (*Medicagopolimorph L.*)

Table 2-3 *Covering, with species adapted to clay, neutral or acid pH soils*

Neutral and clay soil	Seed (Kg/ha)	Acid soil	Seed (Kg/ha)
<i>Medicagopolymorpha</i>	3	<i>Trifoliumsubterraneum</i>	5
<i>Medicagorugosa</i>	3	<i>Trifoliumvesiculosum</i>	2
<i>Medicagoscutellata</i>	3	<i>Trifoliumincarnatum</i>	2
<i>Medicagotruncatula</i>	2	<i>Trifoliumbalansae</i>	3
<i>Trifoliumhirtum</i>	2	<i>Ornithopusstativus</i>	3
<i>Trifoliumresupinatum</i>	2	<i>Ornithopuscompressus</i>	3
<i>Trifoliumsubterraneum</i>	5	<i>Biserrulapelenicus</i>	2

<i>m</i>			
<i>Dactylisglomerata</i>	3	<i>Loliummultiflorum</i>	10
<i>Loliumperenne</i>	7		
Total Seeds	30		30

· The good productivity and turnover of olive groves requires an excellent development of olive trees in the early years. The partial elimination of the herbs along the line may contribute to this objective (Figs. 2-4 and 2-5);

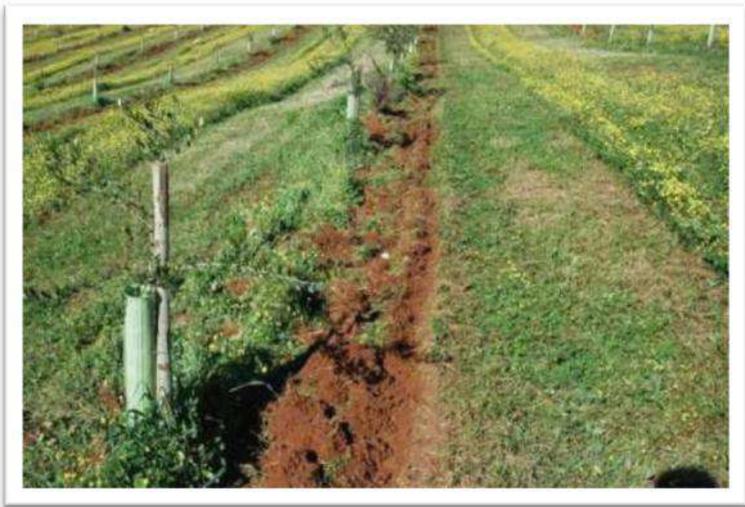


Figure 2-4 Mobilization along the line - one side is not yet done yet. The sandwich method was applied for organic apple orchards



Figure 2-6 Cutting the grassing (seeded + spontaneous), and triturating of foliage pruning, with decentered hammer-type blades machine

- Soil conservation should always be present in all agricultural practices applied in the olive grove and in particular in sloped lands, as are most of the olive groves in Portugal and in the World. The largest part of the authors who have studied the soil erosion issue agree on the best solution to this problem. The main propose is to cover the soil with herbaceous vegetation. This cover has three functions:

1) To reduce the number and intensity of the impacts of water drops of rain on the soil;

2) Increase the speed of water infiltration into the ground;

3) To fix carbon in the soil through photosynthesis and the subsequent formation of humus or stable organic matter.

Table 2-4 shows the results of an experiment made with a rainfall simulator in three types of soil covering in an olive grove where the only practice preventing erosion is the covering with herbaceous sown in early autumn.



Görsel 2 6 Çekiç tipi ot biçme makinesi ile çim biçme, öğütme ve yaprak budama

Soil conservation should always be present in all agricultural practices applied in the olive grove and in particular in sloped lands, as are most of the olive groves in Portugal and in the World. The largest part of the authors who have studied the soil erosion issue agree on the best

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Table 2-4 Three soil management systems under test with rainfall simulator for 15 minutes and measurement of superficial overflow and soil loss by water

Soil covering	Superficial overflow (l/m ²)	Loss of soil by erosion (g/m ²)
Green manure barley based (<i>Hordeum vulgare</i>) sowed in autumn	3	10
No mobilization and total herbicide	25	485
Total mobilization without herbicide	24	1300

1.2.2 Organic Fertilization

1.2.2.1 Soil fertilization

Soil covering and green manuring, previous mentioned, are also fertilization techniques. If they are not good enough to fertilize the olive grove, one can still turn to the following:

- 1) The application of organic wastes on soil as fertilizers, like solid olive mill waste (SOMW) and olive oil mill waste water (OOMWW) from the mill must be considered the priority technique
- 2) Additionally, authorized correctives and organic/mineral fertilizers, although not from organic production, can be used.

The SOMW can be of three types - virgin from three phases press, virgin from two phases mill and from discontinuous (traditional) press-type mill. The first and third have commercial value, whether for oil extraction, whether for use as fuel after withdrawal of the oil. The two-phase SOMW has more water (OOMWW) and therefore represents a cost, not an income .



Figure 2 7 SOMW from two a two phases mill, and olive leaves from the cleaning process (background in the photo) and tannery waste, stored in a plastic waterproofed manure for composting

The two phase olive SOMW can be employed in composting, later on used as organic corrective and nutrients supplier (Fig. 2-8, Tab. 2-5).



Figure 2 8 Composting of SOMW, grape stalk and tannery waste to fertilize an olive grove

Table 2-5Composition of compost made from two phases press SOMW (64%), grape stalk (33%) and olive leaf (3%)- Notes: (1) odm: over dry matter

Fertilizer	Humidity (%)	Organic Matter (%) odm (1)	N-total (%) odm(1)	N-NH4+ (mg/Kg) odm(1)	C/N	pH	Electrical conductivity. (dm/cm)
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Compost	26,27	53,70	1,04	26,50	25,8	7,46	0,77
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The compost mentioned in Tab. 5 has a high content of organic matter and a very substantial amount of nitrogen. An application of 10 t/ha gives about

100 kg/ha of nitrogen to the olive grove, and a significant portion of it would be available within two years.

To achieve more uniform compost in a shorter period is necessary to revolve frequently, which will be facilitated by appropriate equipment (Fig. 2-9). More important than this is the addition of a structuring agent to the wet SOMW, in order to compensate the lack of porosity of SOMW (Cegarraet al., 2004). The ability to join different materials is the support of a successful composting process.



Figure 2 9 Equipment for turning and aerating compost

Without this skill we risk making silage instead composting.

With the addition of more nitrogen organic waste, such as tannery waste (waste of tannery without chromium), is possible to obtain compost with higher content of nitrogen, up to about 3% odm. Above this value, the organic corrective can be classified as fertilizer.

The compost pile should be covered with a suitable geotextile blanket, which allows air entrance, but not water and protects the top layer from the sunlight (Fig. 2-10).



Figure 2 10 Geotextile blanket on the compost pile for protection against rain and sun

This avoids the leaching of nutrients and organic matter and the consequent pollution of aquifers and/or water lines, as well as the fertilizer impoverishment. It also prevents drying and destruction of millions useful microorganisms that lay in the compost. After several months of composting process, quality compost can be achieved (Fig. 2-11).



Figure 2-10 Geotextile blanket on the compost pile for protection against rain and sun

According to the place to be applied, OOMWW from the three phases presses may be considered as a polluting product or as a fertilizer. In a water line, the OOMWW organic compounds cause a lack of oxygen in water and subsequent death of fishes and other aquatic animals. In agricultural soils this amount of organic substances can be considered as a fertilizer, if certain levels are not exceeded. The high level of organic matter, potassium, nitrogen and phosphorus, in the OOMWW make this waste an inexpensive source of these nutrients (Garcia-Ortiz, A. et al.,

1995). In the year 160 b.C. Marcus Porcius Cato, in his book "De agricultura," recognized the fertilization value of OOMWW! European agricultural offices only recently found out all this value, after having closed many mills because they have no solution for this waste, although many tests were already made in other countries, mainly in Italy, where the law 574/96 has allowed its application to the soil (Tamburino et al., 1999).

Table 2-6 Organic matter and macronutrients from two types of OOMWW in olive oil presses

Parameter	Pressing mill	Three phases continuous press
Organic matter (%)	10,5	2,60
Nitrogen (%)	0,20	0,06
Phosphorus (%)	0,05	0,01
Potassium (%)	0,36	0,12
Magnesium (%)	0,02	0,004
pH	4,5-5,0	4,7-5,2

Nowadays, to apply OOMWW to the soil, which is preferably done between March and November. With this dose, about 8,4 t/ha/year are applied (hydraulic press) or 2 t/ha/year (continuous extraction method). This last value must be increased, as Italian researchers propose to Italy, where the maximum portions vary from 50m³/ha/year

in the discontinuous extraction method to 80 m³/ha/year in the continuous system (Tamburino et al., 1999).

Branches pruning (with diameter less than 40 mm) are another value residue that must return to the soil, instead of being burned. These branches must be crushed with a hammer-type blades machine and left unburied on the ground. Apart from organic matter that slowly mixes with the soil, producing humus, nutrients are also released to the soil. For each ton of branches with 50% moisture, 4kg of nitrogen, 0,5 kg of phosphorus, 4kg of potassium, 5kg of calcium and 1kg of magnesium are released. This way, the CO₂ and other greenhouse gases productions are reduced, since the amount of organic matter and carbon is very high. It is estimated that for each 100kg of harvested olive fruits, 65 kg of stems and leaves and 15Kg of wood (over 40mm in diameter) are produced.

When the application of these wastes as fertilizers is not enough to fulfill the culture's nutrient needs, we must undertake an additional fertilization. Among the macro nutrients, nitrogen and potassium are the most needed for olives trees. The annual organic exportations are also dependent from olive fruits production. With productions around of 3,5t/ha, nutritional requirements are as shown in Tab. 7.

Table 2-7 Olive tree NPK nutritional requirements for a yield of 3.5 t/ha

Note: NPK – Nitrogen; Phosphorus; Potassium

Yield (t/ha)	Nitrogen – N (kg/ha)	Phosphorus – P (kg/ha)	Potassium – K (kg/ha)
3,5	100	50	150-200

The fertilization is distinguished into organic and mineral. The first one has the purpose of improving the physical characteristics of the soil, such as structure, porosity, permeability, tackiness, consistency, water retention, and the pH, using green and animal manures, amendments, and composts. The second one is destined to nourish the plants, using chemical fertilizers spread on soil, or through watering systems, or foliage.

The principal nourishing elements, called macro-elements, are nitrogen, phosphorous and potassium.

Nitrogen is fundamental for plant growth: it participates in the synthesis of amino acids and proteins, in the formation of flowers, in the fruit set and in fruit development. Lack of nitrogen causes a reduction of growth, formation of defective flowers, low yield and alternate bearing.

Phosphorus is a growth regulator, essential in cellular division and in the development of the meristematic tissues, enhancing fruit set, fruit growth and maturation, and lignification of the shoots. The effects of phosphatic fertilization are shown nevertheless with extreme slowness because of both the relatively modest demands of the olive, and its immobilization in the ground. Lack of phosphorus, however rare, is manifested with a reddish or purplish leave coloration, and metabolic issues that reflect on growth and on fructification.

Potassium promotes the accumulation of carbohydrates such as starch, energetic reserve for the metabolic processes; it regulates the water balance of the plant increasing water retention of tissues and the regulation of transpiration; it is also an enzymatic activator, enhances inolution and increases resistance to extreme temperatures and some

fungal diseases. Potassium is absorbed in a relatively elevated quantity by the olive, but the agrarian grounds are generally wellendowed with it, above all clayey soils. Like phosphorus, is minimally soluble and fixed by the ground. A lack of potassium is very rare, eventually manifesting with decoloration and apical necrosis of the oldest leaves.

Other important nourishing elements for the olive are magnesium, calcium and boron.

Magnesium is an essential component of chlorophyll, but is generally not considered in fertilization plans, as it is sufficiently contained in many fertilizers.

Calcium is another element essential for growth, being a constituent of cell walls that contributes to the mechanical resistance of tissues, also acting as an activator of some enzymes. A lack of calcium can be due to soil acidity, and will be corrected with an adequate calcium supply, i.e. such as carbonate.

Boron acts in pollen growth, fruit set and plant productivity. A lack of boron is manifested with apical chlorosis of the leaves, followed by necrosis and leaf drop. Slight boron deficiency causes low fertility of the flowers, and an increase of ovary abortion. Boron deficiency is nevertheless easily resolvable through leaf treatments during the pre-flowering stage.

In intensive, specialized olive orchards, the supply of fertilizers is carried out in different ways, according to the state of the crop and the purpose of its application. Fertilizers are normally spread on the soil, because the nutrition of trees depends physiologically on the absorption of nourishing elements through the roots.

1.2.2.2 Fertigation

Fertigation consists in the supply of fertilizers to the trees through the watering system. Macroelements (N, P, K) are usually distributed by fertigation, while microelements (Mg, Fe, Bo) are supplied to the plants, when necessary, through leaves.

The advantages of such a practice consist in the easiness of application and in the efficiency of fertilizers, allowing a reduction in the requirement of fertilizers of up to 30% in comparison to soil distribution, and a sensitive reduction of the management costs in terms of purchase, transport and distribution of fertilizers, enhancing their efficacy to grant a suitable nutritional level to the trees, to maximize yield, oil production and profitability.

Mixtures of water-soluble or liquid nitrogen, phosphate and high strength potassium fertilizers, single or in various ratios, are employed in the practice and are also added to by secondary elements (Mg, Fe) and microelements (B, Zn). Such solutions, in strengths defined by fertilization plans, are conveyed in the watering system, using fertinjectors that work using the water flow to aspirate, by the Venturi principle, dilute and carry the nourishing solution.

1.2.2.3 Foliar Fertilization

Besides that through the roots, olive tree can also absorb nutrients through foliage, which allow a quick and effective satisfaction of the plants demands both to support fructification in the on years, and to resolve lacks of microelements, or in extreme cases in which it is not possible to apply fertilizers to the ground.

The advantages of this technique are manifold: timely intervention, nutrients are supplied at the moment of greatest necessity and effective in a short time, integral use of elements that allows a reduction in the

amount of fertilizers required by soil application. Even though foliar fertilization cannot entirely replace nutrition through the roots, results of many experiences carried out in different environments and olive orchards, using both single and variedly associated commercial fertilizers, and olive-specific Israeli commercial products, confirmed the effectiveness of this olive nutrition practice among sustainable cultivation strategies.

1.3 ORGANIC EXTRA VIRGIN OLIVE OIL PRODUCTION

The identification of the cultivars present in an olive farm is the first requisite for the production of high quality extra virgin olive oil. This step is recommended in order to identify the optimal harvesting time which is typical for each cultivar, to adapt the operative transformation conditions to the chemical and physical olives composition properties, and therefore to optimise the entire process which transforms olives into olive oil.

1.3.1 HARVEST AND TRANSPORT OF OLIVE FRUITS

Harvesting can be carried out using different systems: manual harvesting, shaking or mechanically by raking, or with mechanical shakers. The most used technique is manual harvesting, but mechanical harvesting is gaining popularity due to the high labour costs involved in manual harvesting. It is essential to avoid lifting olives from the ground, because some elements which are naturally occurring in the soil, such as microorganisms, facilitate contamination of the fruits by moulds; or even metals such as iron or copper which compromise conservation of the oil as they accelerate the oxidation process.

At harvest and transport some important goals must be achieved:

- Do not break productive next year branches;
- Do not make wounds in branches which can be gateways to olive knot;
- Do not hurt the olive fruits, since these and olive oil quality depends upon healthy fruits.
- Harvest the olive fruits in a good state of maturation, neither too green nor too ripe;
- Transport conditions must avoid the olive fruits crushing and fermentation.

To achieve these objectives harvest cannot be made with long wooden sticks, which is the traditional practice of olive fruits harvesting.

Alternatively, the following practices can be considered:

- manual harvesting in small olivegroves.
- mechanical harvesting with electric (battery) or fuel hand olive harvester, in medium-sized olive groves and cultivars where fruits do not fall down byvibration.
- branches vibration with fuel vibrator, medium-sized olive groves, when the above technique is not possible or tree vibrator is not advisable (old trees or bad access fortractors)
- trunk vibration with vibrator attached to a tractor or to a self-powered machine, for largegroves.

Harvest should be followed by immediate transportation to the olive mill in order to produce the olive oil in the same day or in the next day. In transportation, open rigid boxes must be used, instead of closed bags or bulk transport with a very high quantity of fruits.

At the olive mill, leaves must be removed and the fruits cleaned. The olive oil production should start within 24 hours after harvesting.

Prolonged storage of olive fruits causes fermentation. This leads to breaking the links between fatty acids and glycerol from fat, leading to the increase of free fatty acids, i.e., acidity. Other flavor and smell defects can also be found (fusty, winy, mold), which are easily detected in a tasting prove, causing the immediate disqualification in any olive oilcontest.

In what concerns to the harvest season, a good maturity occurs when later fruits have purple color and the others are already black. If consumers valorize bitter taste, harvest can be done earlier, when less mature olive fruits are in the transition from green to violet color.

Olive fruits should also be harvested to prevent further oxidation and eventual olive anthracnose when olive fly attack occurs. In olive fruits attacked only with olive fly is still possible to obtain olive oil with less than 1% acidity. With olive fruits attacked by olive anthracnose this is no longer possible, since these fruits will greatly decrease the quality of the olive oil. The extraction process should be separated in this case, as well as for the olives on the ground which will still be used.

To ensure a good sanitary quality, pesticide preventative treatment with copper should be done on early rain falls. This procedure assures fruits protection from infections caused by fungi spore germination, in particular olive anthracnose (Fig. 3-1).



Figure 3 1 Olive fruits in good sanitary conditions, treated with copper fungicide for protection against major diseases (olive anthracnose, peacock spot, Cercospora leaf spot, olive knot).

1.3.2 PRODUCTION TECHNIQUES

Virgin olive oil production does not use chemical solvents. The product is obtained using only physical processes, which assures greater quality. To obtain a product with maximum quality, fruits must be in good sanitary conditions. Besides that, inside the fruit, oil must maintain its own characteristics, avoiding oxidation processes or volatile compounds losses. This can be achieved with some caution during the successive phases of the technical procedures at the olive mill.

1.3.2.1 Olive Storage and Transport

After harvesting, it is recommended that olives are transported to the oil mill in perforated plastic crates with a maximum weight of 25 kg. It is a simple operation yet, if conducted incorrectly, has the potential to cause a negative effect on the final quality of the oil. They should then be processed within a few hours of arriving in the mill (about 8 hours), the storing environment must be sheltered from outdoors, be cool and aerated (with a temperature of 14-18 °C), and be clean and odourless.

The olives must be kept in cool aerated places and preferably protected from light and heat sources. Particular attention must be paid to this phase in order to avoid problems of overheating, of mould or anomalous fermentation due to an extended lack of aeration of the fruits or due to having lifted them from the ground. For this reason, intact olives must not be stored along with olives which are at an advanced stage of ripening, nor with those which have been lifted from the ground and which have surface damage and evident surface blemishes. This advice allows olives to be kept intact as long as possible, containing the action of endogenous enzymes (lipase) which are responsible for the increase in oil acidity as well as external microbial proliferation which is responsible for the decaying processes such as the fermentation phenomena which determines oil defects such as the oil being winey or fusty.

1.3.2.2 Leaf Removal

This operation, which is carried out using an oscillating screen, often together with aspirators, is necessary to avoid the accumulation of large quantities of leaves or other vegetable waste during the productive process, but it also serves to remove foreign bodies such as parties of soil, stones, wood residue, etc..

Nevertheless, the common practice of leaving some leaves in the working process to influence the final oil colour does not, contrary to common belief, significantly change the total chlorophyll value present and consequently the intensity of the green colour of the oil. Such a value is entirely dependent on the degree of ripeness of the fruits.

1.3.2.3 Olive Washing

Before milling, a good rule is to wash the olives generously in drinking water. Washing allows for the removal of stones and twigs thus lowering the risk of damage to the milling system, as well as removing any damaging exogenous microorganisms and/or residues of phyto-sanitary treatments so that olives suitable to be transformed into a quality product are obtained.

1.3.2.4 Olive Crushing

Olive malaxation has the objective of obtaining a homogenous paste, the consistency of which depends on the degree of ripeness of the olives and on their quality. It must be carried out for about 20 minutes, using typical "molazze" or disk or hammer mills.

The traditional olive crusher which was used for many centuries was the stone crusher. The stone crusher consists of a basin formed by a plinth and a stainless steel edge with an opening for the unloading of olive paste at the end of milling.

Two or four granite wheels rotate and revolve on a rough granite base at different distances from the centre of the tank. The rotation speed is normally 12- 15 rpm. The popularity of the stone crusher extraction system using pressure gradually declined. In comparison with continuous crushers, this apparatus shows significant limitations in terms of olive oil quality. In particular, it reduces the phenolic concentration as the olive pastes are in long, extensive contact with air during processing. Contact with the air stimulates polyphenol oxidase and peroxidase, producing a high oxidation of phenolic compounds. The crushing operation in oil extraction by centrifugation is generally replaced by the use of continuous crushers.

On the contrary, with olive presses the pulp and stone are instantly cracked by a ring with a nut in the middle where the olives are violently broken into pieces.

Thanks to its rapidness, this system is recommended for all the cooperatives which need to process large quantities of product within a short time frame. The bitter and spicy taste of the oil is almost certainly due to the use of this method. Consequently, the highlighting/exaltation of a particular class of antioxidant substances (polyphenols) increases. The level of fruit ripening also influences the use of this system, which is more appreciated when the olives are picked when not completely ripened.

1.3.2.5 Malaxation Process

The mixing and heating (25-35 °C) of the olive pastes during malaxation causes the breakdown of water-oil emulsion, allowing oil droplets to form larger droplets, which separate easily from the aqueous phase during the solid-liquid.

The olive paste, obtained through pressing, is characterised by the presence of numerous enzymes. Some of these enzymes which influence the quality of the final oil are: polyphenol oxidase; peroxidase, lyxoxigenase and glucosidase.

Such enzymes are endogenous and compartmentalised in whole olives but, as with glucosidase, they can even be of an exogenous nature, deriving from contamination of the paste by microorganisms. Polyphenol oxidase and peroxidase have a decaying action on the phenolic compounds of the olive paste, reducing its antioxidant power.

Lipoxygenase is the enzyme that activates the enzymatic path of the degradation of free fatty acids, linoleic acid and linolenic acid, in order to form aldehydes, alcohols and esters, which are responsible for the typical oil aromas such as fruttiness. glucosidase is the enzyme which hydrolyses the main phenolic compounds of olives, oleuropein and ligostride, in the corresponding glycones, so that they are rendered more soluble in the oil.

The activity of such enzymes is conditioned by time, by temperature, by water activity and, in the case of polyphen oxidases, peroxidases and lipoxygenases, by the atmospheric oxygen content level when kneading.

In olive (*Olea europaea* L.) fruits, the lipoxygenase (LOX) pathway is responsible for the production of desirable organoleptic properties that differentiate virgin olive oil from other vegetable oils. Hexanal (E)-2-hexenal, (E)-2-hexen-1-ol, 1-hexanol, and (Z)-3-hexen-1-yl acetate are five biomarkers produced as a consequence of lipid degradation following tissue disruption, and they are among the most important volatile compounds in olive oil aroma. Olive fruit growth and development takes place in 5 months after flowering, depending on the variety and climatic conditions, and it includes different phases such as cell division, cell expansion, and storage of metabolites. The quality of olive oil is influenced by genetic and environmental factors and also by the maturation state of drupes, but it is equally affected by technological treatments such as malaxation.

Malaxation for 20 to 40 minutes allows small oil droplets to combine into bigger ones which can be removed by centrifugation. Centrifugation is an absolutely necessary step for effective extraction of the oil. Longer mixing increases the oil yield and allows the formation of minor

components that enhance its flavour, but it produces more oxidation products which make the oil acidity and peroxide values higher, shortening its shelf life. It has been stated that an enzymatic system is present in olive fruit, which is genetically determined, including acylhydrolase (AH), LOX, fatty acid hydroperoxidelyase (FAHL), alcohol dehydrogenase (ADH), and alcohol acyltransferase (AAT). It becomes quickly active upon cell disruption and is involved in the formation of green sensory notes, covering the range between sweet-fruity-green to bitter-powerful-green. Thus, the process of obtaining olive oil can be considered a good example of a system that produces secondary green volatiles.

1.3.2.6 Olive Oil Extraction Systems

Different extraction technologies, such as pressure and centrifugation and selective filtration (i.e. "surface tension" or "percolation") enabling the separation of oily must from the olive paste can be used.

The majority of VOO is currently extracted by centrifugation in Mediterranean countries. The decanter consists of a drum containing a cylindrical and a conical part with a horizontal axis, inside which an additional cylinder worm is placed, which acts as a screw conveyor. The differential speed of the latter is slower than that of the outer drum in order to discharge the solid part. In recent years, this extraction system has evolved considerably in order to reduce the amount of water used during the process. In fact, the decanters can be classified as follows:

1. traditional three-phase decanters.
2. two-phase decanters.

In this regard we can affirm that in traditional three-phase decanters which require the addition of olive paste to a large quantity of water (water addition ranging from 0.5 to 1 m³/ton) in order to reduce the viscosity and increase oil separation, there is a modification of the phenol compound distribution, not only hydrophilic, which are lost

during the aqueous phase. Two-phase decanters, which do not require water addition, allow limitation of this negative effect.

Over the years, numerous improvements have been introduced leading to the use of the two-phase decanter. Fundamentally, these are changes which have consented the centrifuging of olive paste without water. In this way the decanter releases only two phases: the oil and olive residue while it does not emit vegetable water, thus totally eliminating the contaminating effect of the discharge.

1.3.2.7 Separation of the Oil from Vegetation Water

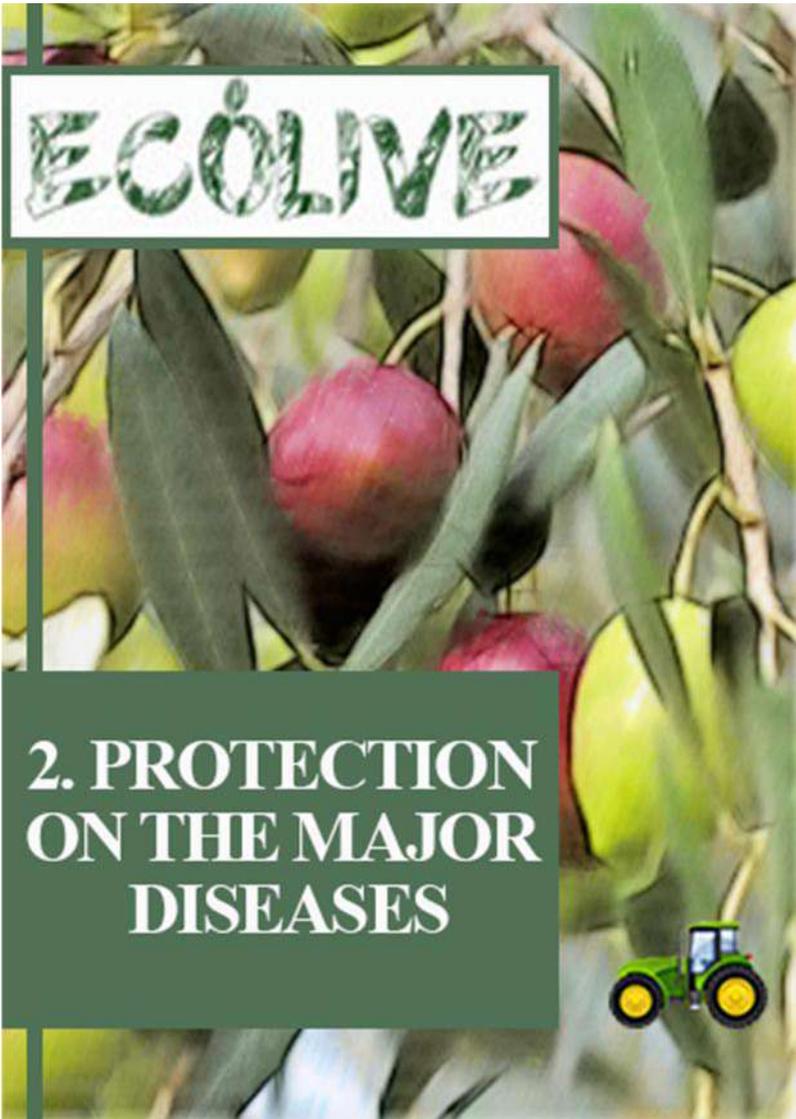
Prior studies have demonstrated the importance of filtration on the quality of extra-virgin olive oil. The extracted oil is cloudy with relative stability formed not only by the oil, but also by traces of water and solid substances. This composition makes the product a seat of chemical and enzymatic degradation, above all affecting the triglyceride and phenolic components and therefore filtration is necessary to stabilise the oil.

During storage, the phenolic composition of extra virgin olive oil is modified by the endogenous enzymatic activities contained in the cloudy phase. These enzymes may reduce the “pungent” and “bitter” sensory notes, the intensity of which is strictly linked to the content of aglyconsecoiridoids, and, at the same time, produce olfactory and taste defects.

1.3.2.8 Olive Oil Storage

Oil filtration partially removes the water and enzymes from virgin olive oils, and enables the phenolic content to stabilize during its storage. The filtration process of virgin olive oil is a procedure carried out in two steps: first, the suspended solids are removed, and second, the elimination of humidity gives the oil a brilliant aspect. Normally, organic or inorganic materials are used in conjunction with a variety of filtration equipment to enhance or enable the separation of suspended solids and water-oil.

After good conservation, olive oil can be sold in different sized containers: usually 3 or 5 litre cans are used, but it is preferable to store it in dark glass bottles, as olive oil is light sensitive.

A close-up photograph of an olive branch with several olives in various stages of ripeness, from green to red. The leaves are dark green and elongated. The background is slightly blurred.

ECOLIVE

2. PROTECTION ON THE MAJOR DISEASES



2.1.SUMMARY

In the following module we will discuss the major diseases of olive trees, the methods and the products that we can use to protect the olive trees in organic farming.

First of all we have to analyze and explain what we mean with the word “diseases”. Farmers when using the word “disease” mean whatever harms their olive trees and reduces their production, but if we want to understand this problem better, we have to organize the “diseases” in categories which will help us to find methods and ways to solve the problem.

“Diseases” can be classified in three categories which are:

- fungi and bacteria,
- pests and
- plant nutrient deficiencies.

In conclusion, whatever we can observe on olive trees that is unusual, makes the olive tree unhealthy and reduces the production happens because of one (and some times a combination) of the reasons above that we analyze more later. Furthermore we describe the main methods and products used in organic farming to protect our plants from the above diseases.

2.2 General Information

According to EU regulations ,Organic farming is the production of plant and animal products based in natural processes without the use of synthetic fertilizers , pesticides and antibiotics, instead the use of mild agricultural practices and the use of compounds (fertilizers and pesticides) that to not pose a major threat to the environment, by taking advantage of modern scientific knowledge and sustainable traditional techniques .

Pest and disease control in organic farming

Any ecological approach in dealing with pests and diseases , that does not rely on the use of chemicals, requires us to understand that usually problems are not just a-one-factor problem (e.g. a particular bacterium or an insect).

The philosophy behind organic farming is that our target is the ecological equilibrium in our olive grove.

Modern perception in organic olive tree farming requires the following

- Respect of the environment
- Use of renewable resources
- Reduction of energy requirements (fuel , electricity etc.)
- Recycling (especially bio-mass recycling)
- Sustaining the natural equilibrium (non threatening insects)

So as you may understand organic farming is not just switching from a chemical insecticide to an organic insecticide, in fact even organic insecticides should be considered as the final solution, when every other practice doesn't have an adequate result.

As a result in the organic farming of olive trees our goal is to create the natural circumstances where the economical impact of pests and diseases is minimal or zero. In order to achieve this our main steps should be

1. Choosing the right varieties of olive trees, local varieties that are acclimatized to the local weather and are resistant to local pests and diseases
2. Good agricultural practices
3. Mechanical methods of dealing with pests and weeds
4. Organic methods of dealing with pests and weeds
5. Protection of the environment's natural enemies of pests

Compounds allowed in organic farming of olive trees

Notice: All synthetic chemical compounds are forbidden, there is a big variety of compound that are allowed in organic farming, but the purpose of this module is not numerate all of them. Instead we will present some main compounds in combination with the main enemies they are dealing with.

	Compounds					
Pests and diseases	Copper compounds (fungicide bactericide) (copper hydroxide, copper	Bordeaux mixture (fungicide bactericide) (copper sulfate and	Pyrethrin insecticide (toxin derived from the flower pyrethro	Kaolin insect repellent (aluminium silicate)	BT toxin (toxin derived from the Bacillus thur. bacteriu	Paraffin insecticide (mineral oil)

	oxychorid e, copper oxide)	slaked (lime)	n)		m)	
Olive leaf spot (Spilocaea oleagina)	Spaying of the foliage					
Bacterial canker (Pseudomonas syringae)	Spaying of the foliage	Spaying of the foliage				
Olive fruit fly (Dacus oleae)			Baited spaying of the	Spraying of the fruit and foliage		

			foliage	trick the insects due to color change		
Olive moth (Prays oleae)					Spaying of the foliage	
Black scale (Saissetia oleae)	Spaying of the foliage to combat sooty mold(if present)					Spaying of the foliage

In the above table we can see some of the “weapons” we have in our organic “arsenal” but keep in mind:

- Just because a compound is allowed in organic farming this doesn't mean that it is not toxic to humans and the environment, pay attention to the application guidelines.
- The use of the above compounds should be considered as the final solution, and if all the other measures taken don't give the desirable outcome.

Below we continue with the main pests and diseases of the olive tree.

2.3. FUNGAL AND BACTERIAL INFECTIONS

2.3.1 Bacterial canker or Tuberculosis of olive trees

The first disease that we analyze is bacterial canker of olive trees, we will study the signs and the symptoms and the ways of protection.

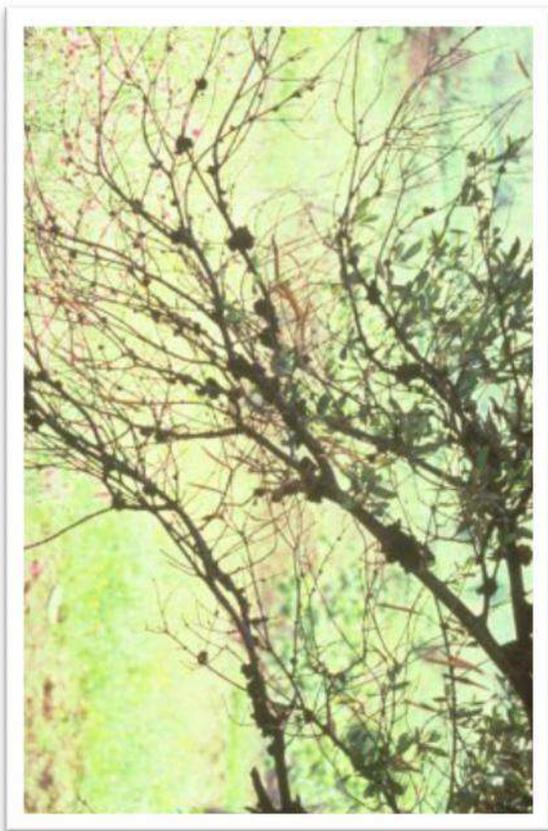


Bacterial Canker (Pseudomonas syringae)

Signs and symptoms

First symptoms are red-brown, more or less lens-shaped blisters on the bark of younger branches or the stems of young trees. These occur at wounds, at feeding sites of the twig miner *Prays fraxinella*, and at lenticels. Early stages of infection can only be detected by close inspection, whereas the later stages are more conspicuous. The blister surface is ultimately split by vertical and lateral cracks to reveal brown-black, proliferated, necrotic bark tissue. Secondary spread of the disease, perhaps promoted by frost damage, produces long, vertical cracks on the trunk, sometimes more than 1 m in length. Infection makes the trees

vulnerable to attack by other pests and diseases, such as bark beetles .



Vulnerable to attack by other pests and diseases, such as bark beetles and other fungi.

Methods of protection

Unless trees are grown for wood production or are significant as ornamental plants, complete control is not generally necessary. Complete control would be by eradication of infected trees. However, because the disease is usually not severe, pruning to remove seriously affected branches is practically effective.

The bacterium can be controlled chemically by spreading olive trees with copper, a product that is allowed in organic farming.

Good practices is the optimum way of limiting the spread of this disease and include

- pruning the trees and harvesting the olive fruit in dry weather conditions (or as dry as possible)
- Cutting and burning branches that are severely infected.
- Disinfecting pruning tools (saw blades and shears) and harvesting tools with alcohol (ethanol or isopropyl ~70%) as frequently as possible.

2.3.2 Olive leaf spot (*Spilocaea oleagina*)



live leaf spot

Sings and symptoms

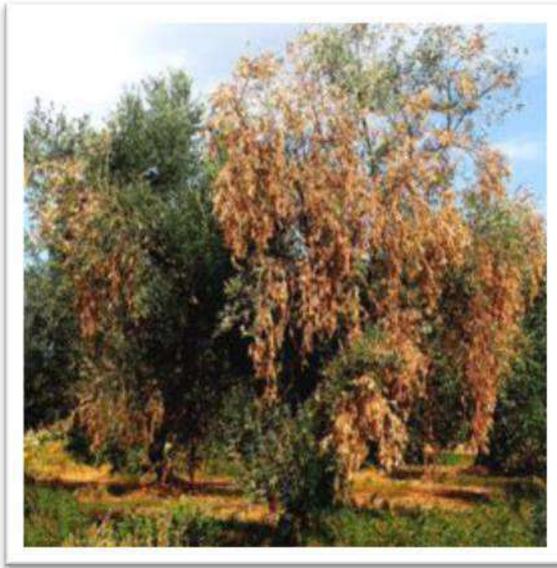
Olive leaf spot is a fungal foliar disease caused by *Spilocaea oleagina* that can affect olive trees. It develops under similar conditions as peacock spot. It causes sooty-mold-like symptoms on the underside of the leaves, yellowing, and leaf drop without leaf spots.

The fungus develops under specific weather conditions, are high temperatures and high humidity.

Methods of protection

The best way to protect the olive trees is to spray them with copper compounds suitable for organic farming.

2.3.3 PHYTOPHTORA



Defoliation of olive trees

Sings and symptoms

Crown and root rot is not common in olive trees, but it can kill or weak trees in excessively wet or poorly drained soils. It is caused by any of several species of soil borne fungus-like organisms, Phytophthora. Olive trees do not like wet soils, so many of the disease symptoms are similar to those caused by poor drainage and poor aeration, but the problems can be accelerated when Phytophthora is present.

The infected trees exhibit reduced growth, have thin canopies, and eventually die. The first symptoms generally occur in the spring, in low areas or areas with heavier soils, but individual, random trees can be affected. If the disease progresses rapidly, trees may die within 1 to 2 years. Root systems of infected trees are discolored, but the *Phytophthora fungus*' mycelium cannot be seen by the unaided eye. If infection has progressed to the crown, a juncture between healthy white bark and dark, diseased tissue is apparent. Otherwise, in order to identify the disease, uncover the lower part of the crown and the upper part of the root system. Remove some bark in the area. Infected tissue will be dark brown or black.



Methods of protection

The fungi live independently in the soil and can survive for long periods of dryness as oospores. Water management is the basis for control. In the first place, it is best not to plant olive trees in areas with poor drainage. Cultural practices that avoid prolonged saturation of the soil, such as planting on berms, shortening irrigation time, and improving water penetration lessen root rot.

2.3.4 VERTICILLIUM WILT



Sings and symptoms

It is caused by *Verticillium dahliae*. It is found around the world. Symptoms appear when leaves on one or more branches of the tree suddenly wilt early in the growing season and the leaves stick to the dead branch. Trees die after repeated attacks over several years. Infections increase with tree age as root systems enlarge and explore larger volumes of contaminated soil.

Methods of protection

Verticillium wilt is a serious fungal disease in olives for which there is no cure, especially after trees have been planted, there is no reliable method of control. Soil solarization has provided inconsistent control in established plantings.

2.3.5. Quick Decline Syndrome of Olive (*Xyllela fastidiosa*)



Sings and symptoms

OQDS (Olive Quick Decline Syndrome) is a disease that appeared suddenly a few years ago in the province of Lecce in the Salento area of south-eastern Italy. The bacterium is of American origin and thought to

have come to Europe with ornamental plants brought from across the Atlantic ocean.

One of the first symptoms is the scorched leaves and desiccation of twigs and small branches that prevails first in the upper part of the canopy then extends to the rest of the crown , giving the tree a burned look. Eventually leading to the death of the tree.

OQDS infected olive grove.

The bacterium can infect a big number of trees and bushes (more than 300 species) and the plant-to-plant transmission occurs only through insects. Some of the trees and bushes infected include almond trees ,cherry trees ,rosemary ,oleander and acacia saligna. The insects that spread the disease are a group of Hemipteran insects called froghoppers (Cercopoidea), in the Salento area the froghopper *Philaneus spumarius* was identified as the main carrier when a very high percentage (>80%) of captured insects were found to carry, and were able to transmit, the *Xyllela* bacterium.

Methods of protection

There is no cure for *Xyllela* as for all fungal and bacterial diseases that infect the xylem of trees. Current knowledge tells that disease eradication and sanitation of *Xyllela* infected plants are unfeasible. Measures are being taken so the bacterium will not spread from already infected areas to areas where it is not present yet.

One measure that the farmer can take for prevention is to avoid getting olive trees , as well as other fruit trees , bushes and ornamental plants, that can be affected by *Xyllela*, from unknown sources or from areas that are already affected.

2.4 INSECTS

The other category that we analyze is pests. With the term pests we mean everything else apart from fungi and bacteria that can harm the olive trees, mainly insects. The most harmful insects for the olive trees that we analyze and that we find methods and ways to prevent them are the following:

2.4.1. Olive Fruit Fly (*Bactrocera oleae*)

The olive fruit fly is a widespread, monophagous pest that feeds exclusively on wild and cultivated olives. Genetic studies suggest that this fruit fly is native to Africa, where its original host plants were wild precursors of the cultivated olive. The widespread distribution of this pest is likely due to the geographical spread of olive growing operations.



Life Cycle and Biology

First, the most basic concepts: the female olive fly mates and lays eggs into the olive fruits. Each egg hatches into a tiny larva (maggot) that feeds throughout the olive and develops into a pupa (pupates) in a hollow area just beneath the outer skin. The adult fly emerges from the

pupa. And the cycle starts again. The olive fruit fly has three, and perhaps as many as six, generations per year depending on local weather conditions.

And now, more details: the olive fly can overwinter as an adult; alternatively, it can spend the winter as a pupa in the soil or in fallen fruit. Overwintered adult populations decline to low levels by February or March. First generation new adults from overwintered pupae start emerging in early spring. The first females can lay eggs in un-harvested fruit from the previous year's crop; later emerging flies can lay eggs directly into new fruit. Olive fruit susceptibility begins at the time of pit hardening, in July or earlier depending on climactic conditions.

The second generation represents offspring from overwintered adults and pupae and emerges between June and August, depending on regional temperatures. These adult flies mate and lay eggs on the new olive crop. During the summer, the olive fly can complete a generation in as little as 30 to 35 days at optimum temperatures. Eggs hatch in 2 to 3 days, larvae develop in about 20 days, and pupae in 8 to 10 days in the summer. Adult flies can live from 2 to 6 months depending on the temperature and food availability (honey dew, fruit juices, bird feces, etc.) A female can lay from 50 to 400 eggs in a life time. Additional generations of flies are produced during the late summer and fall months into December, depending on fruit availability.

In the fall most of the last generation larvae leave the fruit and pupate in the soil under the tree for several months. Adults can also overwinter in protected areas, especially areas with mild temperatures. Olives left on trees after harvest can produce high populations of flies from late fall to early spring.

Damage

As we saw above, the adult female can lay 50 to 400 eggs, generally one in each fruit. Olive fly eggs are small and difficult to see, embedded under the fruit surface. The tiny larvae hatching from the eggs are also

quite difficult to see until they feed for a while and get larger. The first damage sign is an oviposition "sting" on the fruit surface. This looks like a small indentation or lump on the surface of the fruit. Sometimes there is discoloration. While feeding, the larvae tunnel through the fruit, destroying the pulp and allowing entry of secondary infestation of bacteria and fungi that rot the fruit and greatly lower the quality of oil. The oil's free fatty acid level ("acidity") increases considerably. If the damage is extensive enough, it may cause premature fruit drop.

In areas of the world where the olive fruit fly is established and not controlled, its damage has been responsible for losses of up to 80% of oil value because of lower quantity and quality, and in some varieties of table olives, this pest is capable of destroying 100% of the crop. Some European districts cannot grow table olives because control of olive fruit fly is not economical.

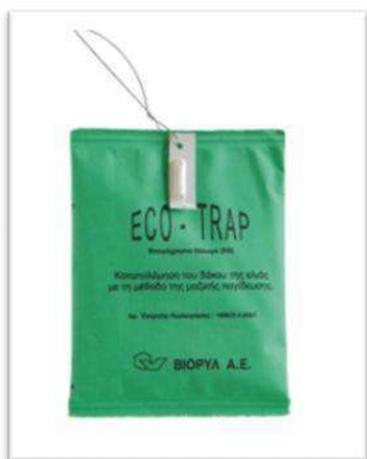


The real problem occurs when larval feeding introduces rotting organisms that create off flavors. This usually happens toward the end of the larvae feeding cycle when the maggots get quite large. Consequently, early harvest may help.

When olives are damaged by the olive fruit fly, the fruit is more sensitive to oxidative and microbial breakdown, therefore the time from harvest to milling should be kept as short as possible and every effort should be made to handle the fruit properly to limit further damage.

Control

Traps baited with food lures and/or pheromones can be used to reduce adult fly densities by mass trapping.



*food and pheromone
trap for olive fruit flies*

McPhail-type traps also can be used for mass trapping olive fruit flies. If used for this purpose, traps should be checked weekly during the summer to ensure that the water-based lure has not evaporated. The lure should be changed regularly to maintain maximum attraction. Several companies currently sell McPhail- type traps. DIY trap video



A typical McPhail trap

These and other mass trapping devices have been shown to reduce olive fly damage by 30% to as much as 100%. Mass trapping effectiveness also is quite variable and may not provide adequate control when used as the only control approach.

In many areas a centralized baited spraying campaign takes place according to the population density (usually conducted by the agricultural authority of the area), although in many cases these are not done with organic certified substances the same philosophy can be applied with organic substances (pyrethrins).

Also minimizing the number of fallen olives that overwinter is another way of keeping the population of the fruit fly under control. An efficient way of achieving this is by allowing grazing animals (mostly sheep) to eat them, along with the weeds, before and after the harvest. Another control, the use

of GF-120, sprays of kaolin clay, and mass trapping are acceptable for use in an certified organic crops.

2.4.2 Olive moth (*Prays oleae*)

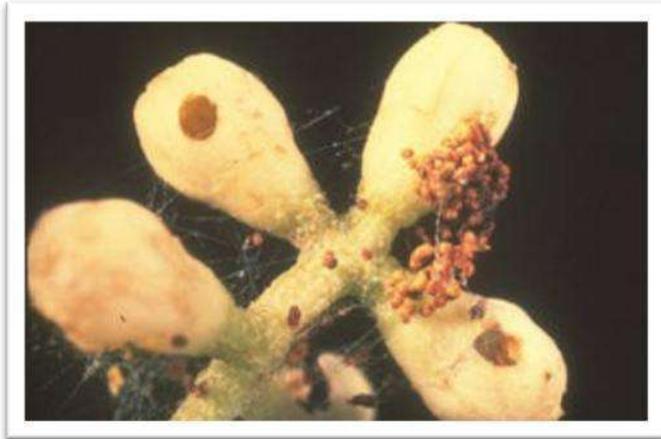


Olive moth

Life Cycle and Biology

Prays oleae or Olive Moth is a plant-eating insect and an example of host adaptation. Every one of their three yearly generations is specialized in benefiting from a different part of the plant. The nutritional value of these "menus" provides a faster or slower development pace, whichever they need for best synchronicity with the tree's phenology. Adults, appearing from May to June, lay their eggs on small fruits, especially in the calyx. Upon hatching, larvae mine towards the fruit and enter the olive before the stone has hardened. They feed on the drupe until mid-September, when they abandon the olive for their crasisis stage on the ground, which lasts until the end of October. New adults lay their eggs on the leaves (October), which starts a plant-eating generation again.

DamageThe type of damage depends on the attacked tissue. The damage (leaf drop) done by the leaf or winter generation (phyllophagous) is not so serious.



GÖRSEL: flower (anthophagous) generation damage from Olive Moth

On the contrary damage caused by the flower (anthophagous) generation can be important.

These larvae directly destroy the flowers or cause the abortion of the flower bunches covered by silken threads spun by the larvae when passing from one bud to the next.

The fruit generation (or carpophagous) larvae cause the premature drop of the fruits when they bore into the kernel of the olive fruit or later when they try to vacate the fruit to pupate.



Fruit generation (carpophagus) damage of Olive Moth

Control

Controlling the population requires strategic planning and implementation. The main “weapon” ,in the organic “arsenal”, against the olive moth (and other lepidoptera) is bacillus thuringiensis var. kurstaki (BT-K).

For the first generation (anthophagous) the spraying must take place just before the blooming of the flowers. Spraying for the second generation (carpophagous) of insects should take place just after the fruit-set phase and for the leaf or winter generation (phyllophagous) at the start of the shoot growth phase.

It is important to notice that the precise timing of BT-K spraying is based on the monitoring of the population density of the insect , especially for the first and second generation (anthofagus+ carpophagus) an assessment should be made with the help of a agriculturist.

2.4.3. Black scale (*Saissetia oleae*)



Black scale

The black scale (*Saissetia oleae*, superfamily Coccoidea) is an important pest of olive trees and citrus. Originally from South Africa, this scale is now distributed worldwide. Black scale can be found on citrus (*Citrus* spp.), cultivated olive (*Olea europaea* L.), avocado (*Persea americana* Mill.), and many popular landscape plants. It is likely that black scale, like many invasive pests, was imported to the Mediterranean on infested nursery plants. Based on their small size and the unique life history of scale insects, these insects are difficult to detect and control.

Female black scales deposit eggs from April to September and, like other species in the genus *Saissetia*, protect them beneath the body until they hatch. Each female can lay from a few hundred to over 2,500 eggs. Incubation time for the eggs varies due to temperature, with eggs laid in the summer hatching in 16 days and eggs in the winter taking up to six weeks to hatch. Black scale typically has one or two generations per year, but three generations have been observed in certain regions. Reproduction is largely parthenogenetic (a type of asexual reproduction where eggs develop without fertilization), males have not been reported in the Mediterranean region.

Damage

Young black scale excretes a sticky, shiny honeydew on leaves of infested trees. At first, affected trees and leaves glisten and then become sooty and black in appearance as sooty mould fungus grows on the honeydew. Infestations reduce vigor and productivity of the tree. Continued feeding causes defoliation that reduces the bloom in the following year. Olive pickers are reluctant to pick olive fruits covered with honeydew and sooty mould.



Sooty mold on olive leaves

Black scale thrives under high moisture conditions, so good aeration of the crown (through pruning) and moderate watering are the first steps against these insects. The insect also has many natural enemies (mostly parasitic wasps) that keep the population under control. It should be pointed out that the honeydew excreted from the scales sometimes attracts ants that “protect” the scales from their natural enemies (wasps), so ant populations should be monitored.

If the damage is serious certain oil sprays (paraffin) are acceptable to use in an organic crop and should be performed during late July and, if necessary, mid August.

Olive trees as all other plant life rely on chemical elements to grow and produce fruit. Carbon (C) and Oxygen (O₂) are the only two elements plants get from the atmosphere while there is a much larger number of elements that plants obtain through their roots.

We can separate the nutrients needed by the olive tree into two main categories, depending on the amount needed by the plant:

- Macro-nutrients

By macro-nutrients we mean the chemical elements that olive trees need in large quantities, usually found at concentrations of a few % of dried plant biomass (leaves).

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- Macro-nutrients

By macro-nutrients we mean the chemical elements that olive trees need in large quantities, usually found at concentrations of a few % of dried plant biomass (leaves).

These include:

Nutrient	Deficient	Optimum	Toxic
Nitrogen	< 1.4%	1.5 – 2.0%	> 2.55%
Phosphorus	< 0.05%	0.1 – 0.3%	> 0.34%
Potassium	< 0.4%	0.8 – 1.0%	> 1.65%
Calcium	< 0.6%	1.0 – 1.43%	> 3.15%
Magnesium	< 0.08%	0.1 – 0.16%	> 0.69%
Sulfur	< 0.02%	0.08 – 0.16%	> 0.32%

- Micro-nutrients

Chemical elements that are needed in plants in much smaller quantities, usually found in concentrations of ppm (parts per million) of dried plant biomass (leafs)

Some of the micro-nutrients are:

Nutrient	Deficient	Optimum	Toxic
Iron	< 40 ppm	90 – 124 ppm	> 460 ppm
Zinc	< 8 ppm	10 - 24 ppm	> 84 ppm
Boron	< 14 ppm	19 – 150 ppm	>185 ppm
Manganese	< 5 ppm	20 – 36 ppm	> 164 ppm

While the olive tree is considered a very robust tree and it can grow almost everywhere , even in the wild without much care, this doesn't mean that it doesn't need nutrients to be added to the soil or water

system, in order to achieve optimum growth and satisfactory olive fruit production.

In this chapter we will discuss nutrient deficiencies symptoms of the main nutrients (macro and micro) and ways for the farmer to diagnose nutrient deficiencies by simple inspection of the olive tree. It is important to notice that in many cases symptoms overlap so the advice of a specialist would be helpful. Also:

- An initial soil chemical analysis, before the establishment of the olive grove and
- a foliar chemical analysis when nutrient deficiencies occur. Are considered essential for the organic farmer.

2.5.NUTRIENT DEFICIENCIES IN OLIVE TREES

2.5.1.NITROGEN (N) DEFICIENCY

Nitrogen is the most essential macro-nutrient for all plants as well as the olive tree, it affects growth as well as fruit production. The annual input of Nitrogen (N) should be about 0.5-1.5 Kg/ tree , or 50-150 Kg per hectare. Nitrogen is mostly needed by the tree in the fruit setting period (end of April to mid May) as well as the growing period (early spring) and the fruit growth period. Keep in mind that Nitrogen (N) fertilization should be accompanied by watering otherwise the intake from the roots to the leafs and branches, will not be sufficient.

Nitrogen (N) deficiency is estimated by the growth of new twigs and branches and also by a certain decolorization of the leafs as seen in the picture below.



For a more accurate estimation of the available Nitrogen (N) in the soil and the dry mass context of the leaves , soil analysis and foliar diagnosis may be required, this can be done in specialized labs.

2.5.2.POTASSIUM (K) deficiency

Another very important macro-nutrient for the well being of the olive tree is Potassium (K). Especially during high yield years large quantities of Potassium (K) is removed from the olive grove during harvest and pruning. As a rule of thumb Potassium (K) fertilization should be analogous to the Nitrogen (N) fertilization in a 2:1 ratio, especially in the year following a high yield year.



A. Potassium (K) deficiency

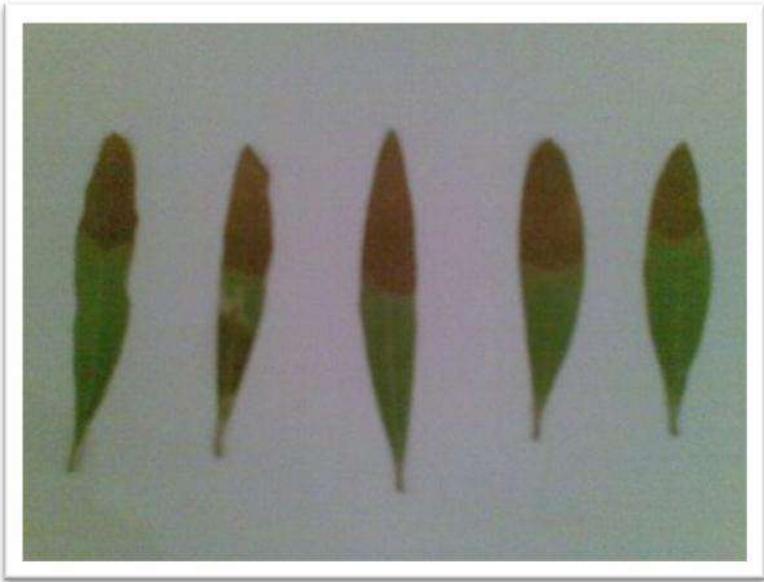


B. Severe Potassium (K) deficiency including twig die back

Potassium deficiency produces a very characteristic discoloration of the leaves, this bronze-like discoloration starts from the tips of the leaves and gradually spreads to the whole leaf (picture A above). Other symptoms include small twig length, twig die back (picture B above), small leaves, and leaf drop. Sometimes Potassium (K) intake may be limited cause of the dry conditions of the field, thus not allowing the roots to absorb enough, and not necessarily in the low levels of Potassium (K) in the soil. In these situations watering during the dry months maybe enough or atleast minimize the effects. For a more accurate estimation of the available Potassium (K) in the soil and the dry mass context of the leaves, soil analysis and foliar diagnosis may be required, this can be done in specialized labs.

2.5.3 BARON (B) deficiency

Boron (B) is considered the most essential of the micro-nutrients for the olive tree, Boron (B) deficiency it is quite common and quite serious , and it can be observed in young as well as very old trees.



Boron (B) deficiency

Boron (B) deficiency

Characteristic symptoms included a distinct leaves discoloration (see picture above) that occurs on the top leaves of young twigs and branches. The discoloration is initially yellow-green and progresses to be yellow-orange. Later the symptoms move to the leaves at the base of twigs and young branches. In cases with moderate Boron (B) deficiency , leaves grow

small, have asymmetrical shapes, and also leaf drop has been observed. In cases with extreme Boron (B) deficiency and during the summer season massive fruit drop is observed, although this may be due to other factors (Verticillium dahliae, bark eating insects, or combined nutrient deficiency)

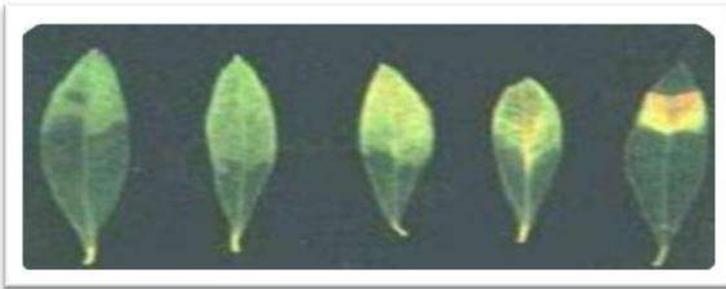
In fully grown trees a dosage of 100-150 gr of Borax [$\text{Na}_2\text{B}_2\text{O}_4(\text{OH})_4$] per tree every 4 years is considered adequate while in younger trees ,the dosage is less and it could be calculated as (10 grams X the years the tree has been planted). So for example a small tree that has been in the olive grove for 5 years should be given $10 \times 5 = 50$ grams of Borax.

Attention: Boron (B) can be quite toxic for the olive trees even in low concentrations so the advice of a professional is essential. Soil analysis and foliar diagnosis may be required, and it can be done in specialized labs.

2.5.4.CALCIUM (Ca) deficiency

Calcium is a Macro-nutrient that is essential to the olive tree, Calcium deficiencies are rare and can easily be treated with the application of marble-dust (calcium oxide) (5-10 Kg per tree) under the tree. The reason we are even mentioning Calcium (Ca) deficiency is because the symptoms (leaf discoloration) are quite similar to those of Boron (B) deficiency. And if you take into account that Boron (B) can be quite toxic, if applied when not needed, special care should be taken to distinguish the two symptoms so we won't have any problems with Boron (B)

toxicity.



Calcium deficiency : Notice the white veins in the discolored areas of the leaf.

As we mentioned above the discoloration of the leaves is similar to the Boron (B) deficiency discoloration but with one major difference (see picture above) The veins in the discolored part of the leaf is white.

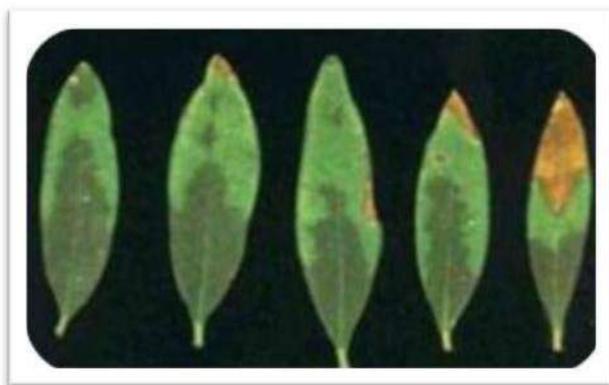
Calcium deficiency maybe rare but it should be dealt with , and the best practice to achieve this is taking measures before the establishment of the olive grove: Soil analysis and measurement of the soils pH, in order to determine if and how much marble-dust (calcium oxide) is required to be added to the soil, lead to a better and much more permanent solution.

2.5.5 PHOSPHORUS(P) deficiency

Phosphorus , a macro-nutrient, is a necessary element for many life processes such as photosynthesis and metabolism of carbohydrates. It helps plants, s

peed-up the maturity process, and increases disease- and drought-stress resistance. It also influences flower setting and general vegetative growth.

Some P deficiency symptoms are similar to those of nitrogen deficiency, such as small leaf size, but without: leaf deformity, red leaf, light green leaf tips or dark green color



Gradual Phosphorus deficiency



Severe Phosphorus deficiency

The characteristic visual symptom of phosphate deficiency is widespread chlorosis of the leaves. However, it is not a safe diagnostic criterion because it is often confused with other causes (e.g., nitrogen deficiency). Safe diagnosis can be done by chemical foliar analysis.

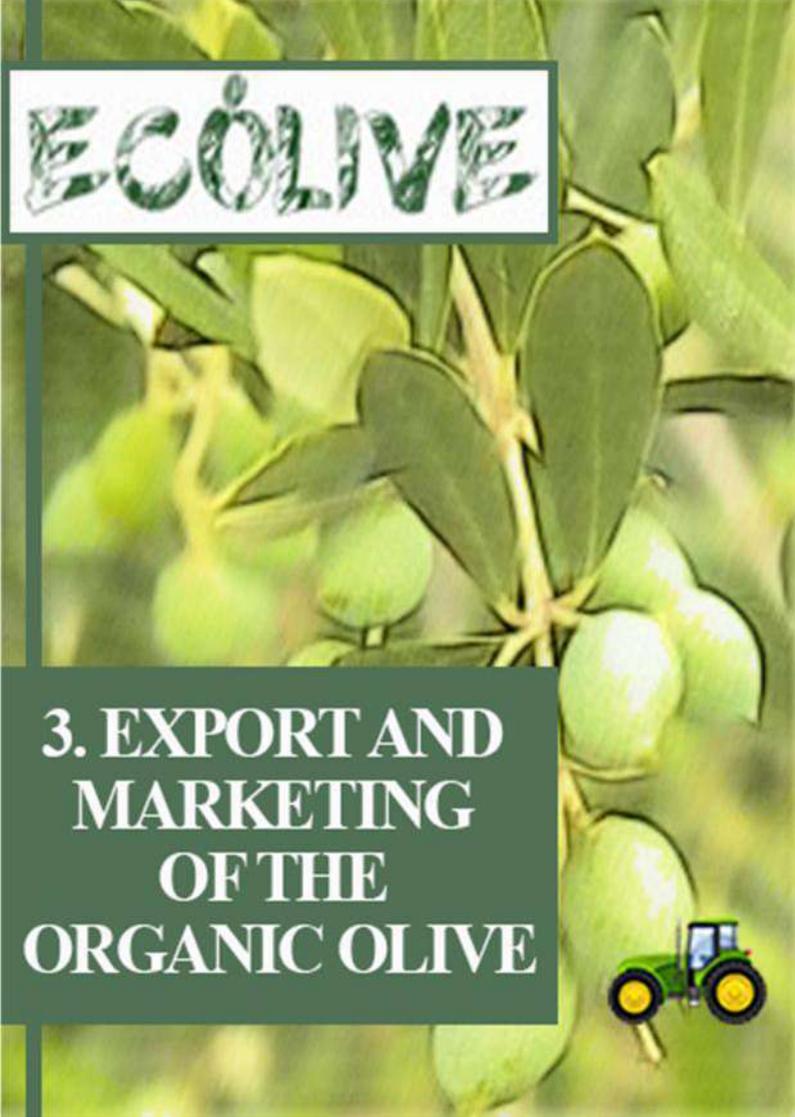
Phosphorus fertilization is especially necessary in acid soils and soils containing high amounts of calcium carbonate. The same applies to orchards planted in shallow, infertile soils or in new, irrigated olive orchards (1 – 10 years old) in which ample nitrogen is used every year.

2.5.6. IRON(Fe) deficiency

Iron, a micro-element, is involved in photosynthesis. Iron (Fe) deficiency can occur even though the soil has an abundant amount of iron, but it is unavailable due to a high pH of the soil or irrigation water. Competition with other ions, such as manganese, zinc and potassium, can also

contribute to iron deficiency by displacing iron from chelating agents (in the soil.

Iron deficiency symptoms include yellowing of immature leaves, with the mid-rib and veins greener than inter-vein areas. Fruits tend to be pale-yellow rather than green-yellow.

A close-up photograph of an olive branch with several green olives. The leaves are dark green and elongated. The olives are small and round, hanging from the branch. The background is a soft-focus green.

ECOLIVE

**3. EXPORT AND
MARKETING
OF THE
ORGANIC OLIVE**



3.1.INDRODUCTION

The purpose of this training module on Export Strategy, Marketing and Pricing is to help companies, which do not have enough experience in international trade activities, to understand basic elements of starting exports with a focus on organic products and virgin olive oil where relevant.

By the end of this module the trainees are expected to:

- Evaluate their reasons for why and why not to export
- Set their SMART objectives for export
- How to set individual operation strategies for export
- How to assess whether their company is ready for exporting
- Setting relevant marketing objectives
- How to set a proper pricing strategy for export
- The methods for selecting the best country to export
- Recognised promotion tactics to satisfy customers in the target market
- The main market research tools

The training module is divided in 10 chapters. In the 1st chapter; the main reasons for starting or not starting export activities are explained and issues to be considered before deciding organic product exports are also reviewed. 2nd chapter is about how to set company export objectives. 3rd chapter elaborates the main questions to ask for assessment of export readiness. 4th chapter gives detailed information about how an export strategy should be developed per individual processes in a business. 5th chapter summarizes a special focus on whether to adopt market or product led strategies. 6th chapter describes the methods used for setting marketing objectives and 7th chapter is about the methods for selecting the country with an additional focus on virgin olive oil markets. 8th chapter gives detailed information about the main marketing tactics and the main tools used for market research purposes are in 9th chapter. The module concludes with international pricing and its principles.

It will take approximately 2 hours to successfully complete studying the module. By the completion of the module, the learners will be required to answer multiple choice and true/false questions. The learners will be required to answer 20 out of 25 questions correctly in total as a criterion for successful completion of learning process.

3.2. GETTING STARTED WITH EXPORTS

3.2.1. Why Export?

Emergence of recent technological developments eased the individuals to move and communicate faster for lower or even no costs. These opportunities also highly affected the business world; the new age opened the businessmen the gates of foreign markets. Even if there are also several risks of entering foreign markets, exporting mostly serve the advantages given below:

- **Increased sales and increased profits:** If the firm is performing well in domestic market in terms of sales, exporting presumably would increase the demand by extending the market base to overseas countries and thus the profitability of the firm.
- **Faster growth:** Selling in overseas markets may help the business grow in size and scope at a faster rate.
- **Reduced local market dependence and overcoming of local market fluctuations and vulnerability:** If the firm diversify sales into international markets, it would avoid depending on a single market. In this case a local economic downturn would damage less if the demand in overseas markets remains high.
- **Economies of scale:** With a larger market base, the firm can save costs by producing on a scale that makes better use of resources; reduce waste by utilizing maximum production capacity and thus increase efficiency.
- **Innovativeness by gaining new knowledge and experience in the global market:** Exposure to new ideas, approaches, marketing techniques, technology and processes can help the firm develop innovative products and services.
- **Domestic and global competitiveness:** Trading in the global marketplace increases the exposure to international best practice, ideas and alternative ways of doing business while improving the chances of competing at home and overseas.
- **Improvement of quality and price combination of products and**

product life cycle

- **Enhancement of the company image**
- **Benefits for domestic economy:** With the increase of production capacity there will be a need and chance of employment creation. Besides, turning into an exporting firm and having higher exports than imports may help domestic economy in the reduction of foreign trade deficit, if any.

3.2.2. Why not Export?

Exporting also brings its own set of challenges and risks. These may include:

- **Increased costs and risk of lower profit margins:** Exporting means costs which are mostly caused by the desire to gain market share, such as the costs of; extra travel, new marketing materials and maybe additional staff.
- **Lower sales than expected:** Sales may be lower in the beginning and it may take time to see a significant return on the export investment.
- **Intense competition:** Competition in foreign markets may be higher than expected.
- **Late or non-payment risks:** To avoid or minimise the risks of non-payment, the firms should research the market conditions in the target country and the credit worthiness of the potential customers before starting exports.
- **Legal and regulatory issues:** There may be different legal and regulatory issues than the home market such as; border-custom types, legal procedures in the cases of corruption, online security and bribery. It is very crucial to get a good grasp of how the procedures work in the chosen country before starting exports.
- **Heavy paperwork:** Authorities in the chosen markets may require a lot of documentation from the exporters.
- **Cultural differences and language barriers:** The firm will be dealing with a new culture by entering a new market. Business culture can even vary between regions of the same country, so local knowledge is vital in

building valuable foreign working relationships.

- **Economic and political risks:** Risks such as unpredictable economic and political systems issues can deter the firm from expanding into a new market. Awareness about what is happening in the target market may help the firm avoid these issues.

It is generally accepted that starting an export venture despite several risks would still benefit the firm, if the firm carefully assess the above listed advantages and disadvantages and take measures when necessary before entering a new market. Exporting activity would lead to changes in the way the business done and increase awareness within the firm's own domain making it more innovative and responsive to changes in the market than otherwise it could be.

3.2.3. Company Specific Reasons for Getting Started with Export

The company should answer several questions before starting an export venture and reach company specific reasons and advantages for export activities. The base for this short preliminary self-recognition should be based upon what role the company expect export to play. Specific reasons should be drafted from the answers to the questions asking whether; the company is seeking an increase in profit or sales volume; it would like to develop a broader customer base, to learn more from overseas companies, to become more competitive in the domestic market, to make use of excess production capacity; the company is seeking for a specified level of return on investment from export activities and the company is expecting the export activities to become self-sustaining (one year, two years etc.).

After deciding upon the overwhelming reasons, the company may then establish their export strategy accordingly. This way the strategy will be more realistic and precise while pulled away from being general and useless.

3.2.4. Getting Started with Organic Product Exports

Many organic product producers opened up to organic products sector after the recent increase in organic product consumption in the world, especially in developed countries. However, the process of transition to organic production and the importance of gaining consumers' trust necessitate long term investments and a careful plan.

In case of organic exports, environmental issues should be considered as much as the economic targets the company wants to achieve through exports (profits, investments, sales volume, etc.). The important factor to compete in export markets is to convince the buyers that the product is organic. In this regard, product certification and meeting the conditions of certification are more of an issue.

Another important factor affecting the organic product choice is the social responsibility behaviour of the company (environmental awareness, following labour rights, perspective to social problems, etc.).

Organic product consumers consider the attitude of the company in these regards as a first step of building long term reciprocal trust.

In summary, it is crucial for the company to pay attention to the following issues below together with the economic objectives before getting started with exports of organic products:

- Setting ecological and social targets while fulfilling standards,
- Determining niche markets and their potential for the company,
- Gaining and retaining customers on long term.

A general methodology for setting export objectives is given in the following section.

3.3. SETTING EXPORT OBJECTIVES

Formulation of export objectives marks the start of strategy stage. This stage is meant to provide the company with a sense of direction: a clear understanding of the future business activities, elimination of doubts, second thoughts and a clear view of the tasks and challenges that lay ahead.

Based on the market conditions and developments analysed before, it is time to define into detail what the company really want to achieve, where, when and how. In other words, the company now should be able to formulate sound objectives. These objectives should provide the building blocks for the company's targets. Therefore they should be SMART: Specific, Measurable, Achievable, Realistic and Time-led.

- **Specific:** Goals need to be clearly defined and unambiguous. When goals are specific they tell you what you need to achieve, by when, by whom and how much it is going to cost.
- **Measurable:** Objectives should be quantitative, expressed in terms of sales value, sales growth, market share, number of customers and etc.
- **Achievable:** Objectives should be set as attainable as possible. There is no point in setting goals that are impossible to reach. They should be based on the company's strengths and its critical success factors (internal) and market opportunities (external).
- **Realistic:** Realistic goals are also the ones that are achievable. To be realistic, one should be willing and able to work towards the main objective and all the necessary resources should be available.
- **Time-led:** The goal should be set as they will be attained in a specific time period.

Specific objectives and their contexts can be regarded as follows:

- **Financial Objectives:** The level of profit and return on investment desired to achieve,
- **Sales Objectives:** **Number of foreign markets desired to export to and timing, level of export sales desired to achieve in a specified time period,**
- **Learning Objectives:** New skills and knowledge desired to acquire,

- **Production Objectives:** Level of production capacity that desired to operate.

3.4. EXPORT READINESS

Determining export potential of a company can be realised in two phases:

1. Assessment of company potential (strengths/weaknesses, organisation structure, etc.)
2. Assessment of target market potential and mapping whether it coincides the company objectives.

3.4.1. Assessment of Company Potential

The company should answer the following questions in order to determine its export potential and strengths/weaknesses:

- Are the executives and employees are trained on export?
- Where and how necessary trainings could be provided? How can they acquire the know-how they need?
- Do the employees have sufficient knowledge of foreign languages?
- Does the company have materials to present corporate image (logos, letterhead, etc.)?
- Does the company have promotion files and price lists, designed well and in foreign languages?

Questions about production capacity:

- Are the production processes at a level to comply with consumer demands (quality, product specifications, etc.)?
- Is the production region in a good condition?
- Is the company able to satisfy the increasing demand?

Questions about financial capacity:

- How much capital is needed for the necessary investments?
- How much of the capital required will be provided by the company resources?
- Where the company will get the remaining capital?
- What is the cost of loans to be borrowed? What kind of procedures will apply for getting the loans?

3.4.2. Assessment of Target Market Potential

Two different assessments are needed to understand whether the target market is suitable for the company's interests:

1. Assessment of target country
2. Assessment of market in the target country (more details about assessment of potential markets can be found in Section 8. "Country Selection").

Assessment of Target Country

The analysis of some basic socio-economic information about the target countries would provide important clues.

General Economic Information

- Magnitude of gross domestic product
- Unemployment rate
- Inflation, etc.

Demographic Information

- Population
- Urbanization rate (the consumers living in urban areas are more interested in organic products)

- Family and housing numbers
- Number of families with children under six years old, in which regions they live
- Percentage of population under 35 years old
- Percentage of elder population taking care of their health
- Social health situation (obesity, hearth diseases, etc.)
- Income per capita
- Structure of income distribution

In addition to these, information about consumer trends and motives could provide important clues about the country profile.

Market Entry Information

- Custom duties and tariffs
- Import licence practices
- General procedures for food imports
- Conditions for organic product imports (certification, etc.)

3.5. EXPORT STRATEGY

Strategy is all about developing a sense of direction for the company. The selected strategy will be determined by the nature of the product or service and by the conditions and requirements in the company's potential markets. Development of an export strategy involves development of; market entry, product, business process, operations and financial strategies. As mentioned before in previous sections, in case of developing a strategy for organic product exports, the company will also need to consider many other factors; quality, requirements and standards of the target market, certification and building relationships with buyers, etc. where relevant.

The management team committed to exporting will take sufficient time to work through and accurately address the below issues. They will establish the levels of corporate commitment and responsibility the company is prepared to undertake to identify and develop expected export opportunities.

5.1. Market Entry Strategy

This stage involves determining target market segments, choosing the market entry mode and selecting the right trade partners.

After selecting target markets it is time to decide on the mode of sales in overseas markets. There are several ways of getting started in exports. Which path to choose will depend on the business's broad strategy, its commitment to export and its capacity to handle complexity.

Market Entry Modes

There are mainly three types of market entry modes defined depending on the nature of product; exporting, licencing, joint venture and direct investment. As our course is designed around mainly export and export of organic products, specifically organic olive oil, the only entry mode is to be exporting. Exporting mode is the traditional and well-established

method of reaching foreign markets. It commonly requires coordination among four players; exporter, importer, transport provider and government. Among the three different modes of exporting (direct, indirect and countertrade), the mode that is most suitable for exporting organic products is direct exporting through local sales representatives or distributors. More information about selecting distribution channels can be found in “Contacts” under Section 7.2.

3.5.2. Product Strategy

Preparing the product for export require not only product knowledge but also knowledge of the unique characteristics of each target market. The company may need to do some degree of adapting the selected product for sale outside domestic markets before starting exports. The company will also need to conduct consultancy with prospective customers, wholesalers, agents and other bodies to determine the best strategy for selling the products in overseas markets.

The company should carefully screen; the ability of product to satisfy foreign needs; the need for modification or development of a new version for the foreign market; specific features, such as design, colour, size, packaging, brand and labels that the product should have.

The product may need to be adapted to target market’s government regulations, geographic and climatic conditions, buyer preferences or standards of living. The most important aspect for product adaptation is conforming to the foreign government product regulations. These regulations are being imposed by the governments for the purposes of protection of domestic industries from foreign competition, customer rights and etc.

The questions that should be answered in the framework of product adaptation are as follows:

- What are the strengths/weaknesses of the product?
- Who wants to but the product?
- What are the requirements of importers and consumers about the product?

- What is needed for product adaptation?
- What is the cost of adaptation?
- Which are the alternative markets to be entered, if the product adaptation will not be realised at the first stage?

Labelling & Packaging

Language and culture of the target country are important factors to consider when preparing the product for export. The package of the product is as important as the product itself when the cultural differences are considered. Because what they first see is its package and they always prefer the product to be labelled in their own language. More information about labelling and packaging can be found in the “Labelling, Packaging, Storage and Transport of Organic Olive Oil” module.

Pricing

The last, but not least, issue about the preparation of the product for foreign markets is pricing strategy. Price is important, because it is the only element of the marketing mix that generates income, all others cost money. That is why all the aspects of pricing strategy should be carefully screened. These aspects can be summarised as; the factors affect the prices settings, product sensitivity to prices changes, type of pricing policy to be implemented (high profit/low turnover and/or low profit/high turnover), discount policies and etc. Detailed information about pricing can be found in Section 11. “International Pricing”.

3.5.3. Business Process Strategy

Export process has some other aspects like shipping, insurance, negotiation with buyers, organisational and staff requirements.

- **Shipping:** In consultation with shippers, the company should find the right shipping method for the delivery on time and affordable cost. The options are; trucking - still popular, but declining; rail – a good option for shipping to seaports for transport abroad; air – faster and safe but expensive and not covering all destinations; ocean - most common method, economic but slow delivery.
- **Insurance:** The company should decide whether to insure the goods for loss or damage during transit and/or for default by the buyer.
- **Negotiations:** Through negotiations with distributors, the company should determine terms of trade that will govern the sale.
- **Organisational Structure:** The company should outline how the export function will be organised, determine the place of this function in the organisational chart, and outline roles and responsibilities, determine whether there is a need for additional staff and expertise.

3.5.4. Production & Operations Strategy

After a comprehensive evaluation of production capacity, the company should be able to determine whether; the current production capacity will allow market expansion and thus the need for more production, to expand product capabilities to meet market demand and additional cost, there are seasonal fluctuations in demand for the product, the viable order quantity could be achieved to ensure corporate profitability and there are changes required for design of packaging and labelling of products.

3.5.5. Financial Strategy

The last, but certainly not the least important aspect of the export strategy is of course the export financing. The company should finalise

the decision of whether there will be a need for additional capital commitment required for the entrance to export markets. An outline of financial needs in relation to additional production capacity, pre-shipment finance, working capital and post-shipment finance will be needed.

It is a fact that, the export drive needs the financial stability and strength that comes from a reliable cash flow. So, a comprehensive financial plan that reflects the financial strength of company would be helpful for the export venture. The most important objective of the plan is ensuring the company always has sufficient cash or operating lines of credit.

3.6. INTRODUCTION TO EXPORT MARKETING

It is commonly recognised that to succeed in exporting, you need a product or service which is in demand in overseas markets. Perhaps less well recognised is the need for skills, resources, commitment and information to support sustained exporting activities over the longer term.

The absence of factors such as these can be a critical exporting barrier for small- to medium-sized businesses. Business and export planning, for example, is one factor linked to export success, yet many smaller companies do not undertake a formal business planning process. Although export market research is only a part of exporting it is the most important in the initial stages to understand where your export markets will be.

Should companies be market or product led?

It is fundamental for companies that are going to carry out any market research to fully understand the above question. Before trying to give an answer to the question, please read the following two scenarios and see if you can spot the difference.

- a. There are lots of sporting enthusiasts living in the local area which is a 100 kms from the sea. A lot of people enjoy football, tennis, and basketball and I have asked a number of people if amenities were available, would they also enjoy water sports as well. The majority said they would, so I am considering digging a large lake on my spare piece of land and provide amenities for windsurfing, jet skiing and fishing.
- b. Since leaving Art College, I have not used all the skills that I learnt. One thing I really enjoy doing is painting on ceramics. I think I will start a business selling hand painted ceramics.

One of the scenarios is product led and the other is market led. The trap that small businesses in particular fall into is that they often forget to ask themselves the question is there a need for our product? - this is called market led. They inevitably produce an idea with no evidence about the demand for it; this is called product led and is often a very costly mistake

because the chances of succeeding are very slim. All product ideas should be market led and not product led.

3.7. MARKETING OBJECTIVES

INTRODUCTION TO EXPORT MARKETING

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themselves the question is there a need for our product? - this is called market led. They inevitably produce an idea with no evidence about the demand for it; this is called product led and is often a very costly mistake because the chances of succeeding are very slim. All product ideas should be market led and not product led.

3.7.1. The Ansoff Matrix

Marketing departments use the output of an Ansoff product/market matrix to provide suggested growth strategies that set the objectives for the export business strategy.

The company should input in each of the segments of the Ansoff Matrix below its own data before making a final decision of its next move into exporting.

	Existing Products	New Products
Existing Markets	<p>Market Penetration <i>is the name given to a growth strategy where the business focuses on selling existing products into existing markets</i></p>	<p>Product Development <i>is the name given to a growth strategy where a business aims to introduce new or modified products into existing markets</i></p>
New Markets	<p>Market Development</p> <ul style="list-style-type: none"> • New geographical markets • New product • New distribution channels • Different pricing policies 	<p>Diversification <i>is the name given to the growth strategy where a business markets new products in new markets</i></p>

3.7.2. The Five Cs of Exporting

In pursuit of the current situation by the questions given above in Section 1.1, the second important step is to set marketing objectives by the use of questions listed below:

- Which countries will I target during my research?
- What will my customers' needs and expectations be?
- How will I distribute my products to overseas markets?
- What advantages do my products have over the competition?

In order to fully define the export objectives, a business can use the 'The Five Cs of Exporting' as an effective method.

The five Cs of exporting are:

- Company
- Country
- Customer
- Contacts
- Competition

Company

The company will need to prepare a document with an overview of the country they wish to export to. The document will contain a detailed description of features and benefits of the products and services that the company has to offer in that country. Full contact details, historical information and how the company intends to market itself in the new market should also be included.

Country

To maximise the return on investment in exporting it is fundamental to identify the best countries to target. A company should select first the country, or countries, with the highest potential, lowest risk and relative ease of entry - that is, the extent to which they are difficult or relatively easy to gain access to. More detailed information on how to select a country can be found in Section 7 "Country Selection".

Customer

Before deciding the country or countries to target, companies need to focus on who their prospective customers are and what they need. The following questions should be answered specifically for detailed analysis of customers in the target market.

- Are they individuals or organisations?
- Where are they located?
- What is their income/turnover?
- How old are they?
- Male or Female?
- Young or old?
- What are their life styles?
- What are their purchasing patterns?

Contacts

It will be impossible for a company trying to sell their product in a foreign country without any help of contacts within the target market. It is crucial to select the right distributor. Whoever is selected as a partner in the target country can often market and distribute a product much more easily and cheaply than the company can do from its own country. As organic product trade necessitate long term strategies, it is important to establish long term cooperation with the distributors. The questions to ask for selecting the right partner;

- How large is the distributor company? (Number of customers, profit, etc.)
- What kind of products are they selling?
- How do they sell the products? Which distribution channels do they use?
- How is the distributor company image?
- What kind of services does the distributor company provide to its customers?
- Does the distributor company make advertisements?
- What is the structure of storage, logistics and contracts of the distributor company?
- What are the prices offered to exporter company?

- How does the distributor company make the payments?
- Is the company reliable? What are the speculations about the company in the business environment?
- Is the distributor company will adequately inform the customers about the exporter company? Does the exporter company need to do something about this?

Competition

Apart from looking at its own strengths and weaknesses, a business should also analyse strengths and weaknesses of any competitor, and before any SWOT analysis on the competition research it will need to establish exactly who it will be competing against in the different markets. The competition may come from a local company or another exporter. This is where a local agent or a market research agency can be helpful as they will know which companies are more active within their country.

By carrying out a detailed research a company need to find out:

- How many competitors are there in each market?
- Who are your major competitors in each market?
- How big each competitor is?
- What are their advantages and disadvantages over your business?
- How do you intend to compete with their advantages?
- With what you will compete in the market?
- Price
- Distribution
- Reputation and image
- Quality
- Which customers could switch to you?
- Who are main customers of competitors?
- Which customers do you want to gain?
- Analyse public information on your competitors through:
 - Websites
 - Press releases
 - Brochures

- Industry reports
- Monitor competition promotional activities i.e.:
- Advertising
- Price promotions
- New product launches
- Recruiting drives
- Opening of new shops

3.8. COUNTRY SELECTION

It is important for a company who has never exported before is to select a country or countries that will be easy, profitable and as low-risk as possible.

The main address to view statistical information about a country is the World Bank: www.worldbank.org/en/country. Almost all countries (from Africa, East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, South Asia) are listed in this link and all countries are provided with all necessary information that a potential exporter needs.

There are however; a large number of global sites to visit to gather various useful import and export information. They are:

- www.macmap.org – Market Access Map - Market Access Map covers customs tariffs (import duties) and other measures applied by 187 importing countries to products from 239 countries and territories. MFN and preferential applied import tariff rates are shown for products at the most detailed national tariff line level.
- <http://www.intracen.org> – International Trade Centre - TC's ultimate goal is to increase entrepreneurship and competitiveness at the enterprise level through products and services responding to the specific needs of exporting enterprises. ITC provides expertise in product and market development as well as market analysis

The following tables will help the potential exporter to decide the best countries to export.

1. List all countries you would like to export to and the reasons why:

Country	Reasons why you have selected it to be on the list of possible countries

2. From list 1 select five countries that offer the highest profit potential

Country	Profit Potentials

--	--

3. From list 1 select 5 countries that have the most favourable market conditions for your product

Country	Favourable Markets

4. From lists 2 and 3 select 5 countries ranked* in order of priority the best country that fits with your company in terms of:

- *Lowest risks*
- *Easiest place to trade*
- *Lowest cost to develop*
- *Easiest regarding contract terms*

Country	Best fit

*** Note: being the best country to trade.**

3.8.1. Selecting Best Countries to Export Organic Olive Oil

When organic product export, specifically organic or virgin olive oil, is in question, the priorities given in the previous section might differ.

Because there will two basic features of these markets;

- Organic olive oil is wanted but not produced enough to satisfy demand,
- Consumers have enough liquidity to actually pay what the olive oil worth.

A realistic assumption about these markets can be made through recent virgin olive oil import statistics in the world.

Table: List of Top Ten Importers of Virgin Olive Oil in the World (Thousand US Dollars)

Importers	Imported value in 2012	Imported value in 2013	Imported value in 2014	Imported value in 2015	Imported value in 2016
World	4.579.246	5.613.619	5.739.083	6.314.275	6.199.094
Italy	1.331.267	1.475.200	1.792.785	1.876.033	1.779.863
United States of America	701.759	798.337	803.665	925.918	1.011.712
France	354.678	442.199	388.270	447.729	479.614
Spain	127.026	334.838	152.698	602.996	314.015
Germany	222.085	272.206	279.671	278.183	283.389
Brazil	245.763	296.707	291.782	223.944	241.218
Portugal	173.213	249.574	218.235	245.187	240.214
Japan	162.163	212.478	219140	235.530	221.498
United Kingdom	136.514	160.125	161.072	181.326	180.694
Canada	117.543	133.795	142.340	132.652	161.717

Source: *International Trade Centre, Trademap Statistics (Product code: 150910 - Virgin olive oil and its fractions obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions that do not lead to deterioration of the oil, whether or not refined, but not chemically modified)*

Italy seems to be the number one importer of virgin olive oil. Italy is also the number one exporter and consumer of olive oil, because it cannot produce enough olive oil within the country to satisfy the demand in national market. However, while searching for a suitable market from the list above, we should exclude this market since focus is exporting from European Countries including Italy. In this case, USA is at the top appears to be the best country to start exporting organic olive oil.

According to U.S. Department of Agriculture (USDA); there are two ways for foreign organic products to be sold as organic in the United States.

Imported organic products must be certified to one of the following:

1) The USDA organic regulations

USDA authorizes organizations around the world to certify farms and businesses to the USDA organic regulations. Learn about the certification process and view a list of certifiers by name or by country: www.ams.usda.gov/NOPFAQsHowCertified

2) An authorized international standard

The U.S. has established trade partnerships with the following international countries. View details

at www.ams.usda.gov/NOPIInternationalAgreements.

Exporting to U.S. from European Union

Products certified to the EU organic standards can be sold as organic in the U.S. (effective June 1, 2012).

Products must be either produced or have had final processing or packaging occur within the EU.

Terms of the Arrangement: To trade products under the partnership, certified operations must ship imports with a National Organic Program (NOP) import certificate, completed by an EU-authorized certification body.

Labeling Requirements: For packaged retail products, labels or stickers must state the name of the EU certification body and may use the USDA organic seal and/or the EU organic logo.

The requirement for exporting to U.S. from EU countries can also be checked from European Commission's website about Trade in Organic Products at; https://ec.europa.eu/agriculture/organic/eu-policy/eu-rules-on-trade/import-export_en.

3.9. PROMOTION IN EXPORT MARKETS

The need to promote a product or service is even more vital in a foreign market than in the company's own country. There are many promotional tools available for a product or service to increase its market share, most of them are the same as those used by the company in their own country.

There are no general rules relating to the level of foreign promotional support used in foreign markets. It should be kept into account that if a promotional technique was successful in one country it does not mean it will be successful in another market. It is important therefore when carrying out a research into a particular country to find out which is the most commonly accepted form of promotion.

3.9.1. Exhibitions

One of the most important elements of a company's marketing mix that comes second only to personal selling and just above advertising, is attending an exhibition or trade fair. Research has shown that international companies can generate as much as 70% of their annual sales at trade fairs .

Exhibitions or trade fairs, like advertising, direct mail, PR and direct selling, are part of any organisation's strategic sales and marketing tool. They should be used as part of an overall marketing strategy, not as an isolated event.

If you are considering exporting to a new country it is worth finding out what exhibitions or trade fairs are being held in that country. Visiting the exhibition will help not only in defining a product strategy for that country but also in finding a local partner or agent and meeting potential distributors.

Before actually exhibiting at a trade fair, a careful analysis must be done on the overall cost benefit to the company.

There are some websites giving information about exhibitions and trade fairs around the world:

- The largest one is Biz Tradeshows. This site lists all types of trade shows throughout the world: <http://www.biztradeshows.com>
- Another comprehensive trade show website is run by the Trade Show News Network (TSNN), and it is reputed to be the world's leading online resource for the trade show: <http://www.tsnn.com>

3.9.2. Website

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3.9.3. Language

Any promotional material that is going to be used it should be in the local language. This not only for printed materials but also websites. As websites can be viewed internationally, it is important to include at least two other languages, apart from the local language, English and maybe Italian, Spanish, or French

3.10. MARKET RESEARCH TOOLS

3.10.1. Primary Research

In conducting primary market research (or field research), a company collects data directly from foreign marketplace through interviews, surveys, feedback and other such direct contact with potential buyers. Primary market research has the advantage of being tailored to the company's needs and provides answers to specific questions, but it is invariably time consuming and very expensive.

Primary research takes the form of:

- Interviews (Face-to-face, telephone)
- Postal or email surveys
- Mystery shopping
- Group discussions or focus groups
- Projective techniques
- Product tests
- Technology - Internet feedback

Looking at the first two of the above, which are the most common:

Telephone Research

Telephone interviews have the benefit of interviewing quickly a large number of people but have limited scope because it may be difficult to get across very complex concepts on the telephone. Points to remember doing telephone interviews:

- Define the target audience
- Have a questionnaire clearly produced and tested

- Make calls at convenient times, if not check when it would be convenient to call back
- Tell the interviewee the purpose of the call and duration
- Use faxes or email to send more detailed information

Postal or e-mail Survey

A number of market research organisations have large databases of customer names and addresses for market research purposes. To obtain a listing of possible clients from this source may be expensive and there is the cost posting the survey. Typically the number of responses will be way below 20% and in most cases will be around 5%.

To increase the response rate of a postal survey:

- Offer incentives or a competition
- Translate into local languages
- Make questionnaire more user-friendly
- Issue questionnaire with covering letter
- Increase sample size

An email survey could be a better solution than postal surveys. It has been estimated that the cost of an email survey is between 5% and 20% of a postal survey. This provides an immediate saving on the postal costs.

Another benefit from email surveys, it has been proved that the response rates are a lot higher than postal surveys in some cases as high as 30%. Before sending out a postal or email survey it is important to trial it with colleagues or friends to see if provides the answers you are looking for.

Field Research Decisions

As can be seen from the discussion points above it is important to decide before carrying out any field research the following;

- The number of interviews required
- Whom you need to interview
- The geographical locations to be covered

This, in jargon, is known as the sampling frame.

As you will be offering a much specialised product to a limited market (organic / virgin olive oil), you will need to undertake only a small number of interviews but it may be that you will need to obtain more in-depth information.

3.10.2. Secondary Research

Secondary market research (or desk research) is based on analysis of statistical data such as trade statistics. To be effective, the data should be reliable and cover significant historical period. Though it is considerably less expensive than primary research, one should be aware of its limitations. For example, the most recent statistics for some countries may be more than two years old. Moreover, the data may be too broad to be of much value to a company. Statistics may also be distorted by incomplete data-gathering techniques. Finally, statistics for services are often unavailable. Yet, even with these limitations, secondary research is a valuable and relatively easy first step for a company to take. It may be the only step needed if the company decides to export indirectly through an intermediary, since the latter may have advanced research capabilities.

A lot of the information can be obtained free, although for more detailed reports you might have to pay a fee to a market research company. The Internet is now a major source of market research information and should be your initial point of reference. Typical information that can be found doing desk research is:

Market Information

- Size
- Structure
- Trends – both past and projected future trends
- Locations

Customer Information

- Customer types, i.e. businesses/individuals, age, sex, lifestyle, income, occupation
- Purchasing patterns
- Preferences

Competitor Information

- Who the main competitors are
- How many there are nationally/locally
- What their turnover/profit is
- Which products they supply

Sources for the secondary research on Internet may be:

- Trade associations
- National and local press Industry magazines
- National/international governments
- Websites
- Informal contacts
- Trade directories
- Published company accounts

- Business libraries
- Professional institutes and organisations
- Omnibus surveys
- Previously gathered marketing research
- Census data
- Public records

3.11. INTERNATIONAL PRICING

If a product of a company is successful in domestic market, the company can be identified as it is good at setting an effective pricing strategy. However, an international pricing strategy should be completely independent from domestic pricing. In order for the product to be successful in foreign markets too, it may need to be rearranged according the target market conditions and this will eventually change the cost structure, thus the prices.

The following steps would help to set a proper pricing strategy:

- 1. Identifying the factors that will affect the price**
- 2. Determining short and long term goals**
- 3. Selecting appropriate pricing model**

3.11.1. Factors Affecting the Price

The following costs and expenses, for the product(s) to be exported, should be taken into account while calculating the export price:

- Direct materials and labour costs
- Factory overhead costs
- All operating expenses from product catalogues to taxes

It is important to allow a realistic price margin for unforeseen production costs, operating expenses, unavoidable risks and simple mistakes.

Other factors affecting price are elaborated below:

-Revenue Target

Companies should have a revenue target for how much of a profit they want to make. That revenue target plus the costs for producing, marketing and selling make the final price per product. What a company should do is to estimate the number of units of a product which they expect to sell over the next year. Then divide the revenue target by the number of units expected to be sold and the company have the price at

which they need to sell their product in order to achieve the revenue and profit targets.

-Competition

It is always helpful to know whether company's competitors offer comparable products and be aware of their pricing. However, if a company puts an additional value to their products compared to the competitors, then they could come up with higher pricing. The following is essential in this regard:

- Offer additional service
- Provide higher quality
- Consider regional differences
- Consider the costs

-Market Trends

Any company should continuously update their knowledge of outside factors that will impact the demand for the product in the future. These factors can vary from environmental and climate conditions through legislation to economic and financial crisis.

Companies need to be flexible and adaptable in order to respond to the market developments and new trends. They need to keep on testing new offers, new prices, new combinations of benefits, etc. It is a fact of fact of the business life that if a company do not raise their prices from time to time as part of the successful management, they will not remain in the market too long. However, prices and costs should be constantly monitored, so that the company stay both competitive on the market and make the profit against their targets. The best way for a company to be sure that the products are priced correctly is by the sales volumes after making a certain change. For example, this can involve keeping a sharp eye on the cash collections for several weeks after the change. If a price increase is too high, customers will react immediately. On the other hand, it always help to watch the reaction of the competitors, i.e. if the change in prices proofs to be positive, then the competitors are most likely to do the same.

3.11.2. Short-Term and Long-Term Goals

Before selecting a proper model for pricing, the company should determine the short and long term goals of the business. Choosing a model that does not align with the course of the company may lead to failure in export journey. For instance, if the company needs to acquire as much of the market as possible to be successful in the long run, it would be a poor decision to price the product as a luxury good. Likewise, a company aiming to compete with a leading luxury brand may ruin its chances by pricing its products at a discount.

Some possible objectives to be considered:

- Be viewed as a luxury brand
- Be viewed as value or high-quality brand
- Maximize short-term profits to attract investors
- Maximise short-term revenue to please new investors
- Profit maximisation

3.11.3. Selecting Pricing Model

After taking into account all possible factors that affect the price and short and long term objectives for pricing, it is time for selecting a proper pricing model. There are many ways to price a product. The following ones are some of them but quite inclusive to fit various situations while setting pricing strategy:

- Premium Pricing

The principle is using a high price where there is uniqueness about the product. This approach is used where a substantial competitive advantage exists and the product can be classified as luxury.

- Penetration Pricing

The principle is to set prices artificially low in order to gain market share. Once this is achieved, the price is increased.

- Economy Pricing

The principle is simple pricing while keeping cost of production and marketing at a minimum. The products which are priced through economy pricing is usually found in supermarkets.

Before determining what prices to charge it is important to determine the total cost of exporting the product. Apart from the factory costs, or ex-works costs, a number of other pricing factors must be taken into consideration before coming to a final selling price. All additional costs have to be investigated during the market research phase, though not all of them may be required.

The factors that need to be clarified during the market research phase include:

- One of the Incoterms regulations; either Free-on-Board (FOB), Free Carrier (FCA), Carriage & Insurance Paid (CIP) or Carriage including freight (CIF).
- FOB: this is the price the supplier pays for carrying the product to the port of shipment.
- FCA: instead of specifying the ship's rail, the FCA term gives the seller the duty to deliver the goods to the 'carrier .. nominated by the buyer .. at a named place'. This place will invariably be an inland depot (container base, road depot, rail terminal or airport) not unloaded for LCL (Less than Container Load) shipments or the seller's premises when

the goods are loaded on the buyer's collecting vehicle for FCL (Full Container Load) shipments.

- CIP: this is where the supplier pays for the carriage and insurance to a point determined by the buyer, after this point it is the responsibility of the buyer to insure - CIF (or Landed Price): this is the price where the supplier pays for carriage, insurance and freight to the port of entry of the receiving country. Normally this term is only used when goods are sent by sea.
- Import Duty (or Import Tariff) of the importing country. It must be agreed by both the buyer and seller who will pay for the import duty. Different types of import duties are:
 - Ad valorem: a set percentage of the value of the good that is being imported.
 - Specific: a specific amount of money that does not vary with the price of the good. These tariffs are vulnerable to changes in the market or inflation unless updated periodically.
 - Revenue: a set of rates designed primarily to raise money for the government.
 - Protective: intended to artificially inflate prices of imports and protect domestic industries from foreign competition.
 - Prohibitive: it is so high that nearly no one imports any of that item.
- Export Packaging Cost
- Other Custom Charges
- Road/Rail Transport ex works to Wharf/Airport
- Customs clearance Costs
- Documentation Costs ECN/Forwarding Agents' Cost

- Importers/Distributors Margin
- Secondary Distributors Margin
- Insurance Cost
- Marine/Air Insurance
- Rejection-related to food products
- Credit Terms agreed with importer
- Foreign currency exchange rates
- Printing documentation in a local language

3.12. SUPPORTING MATERIALS AND LINKS

How to Craft a Winning Market Entry Strategy - Intro:

<http://www.youtube.com/watch?v=iDNpNP4IUKk>

A useful site for best market-research articles and resources:

<http://www.inc.com/guides/marketing/24018.html>

About pricing strategies:

<http://www.youtube.com/watch?v=XBmWEduod5k>

A useful site for the timely news and updates about olive oil sector around the world:

www.oliveoiltimes.com

3.13. GLOSSARY OF TERMS

TERM	DEFINITION
Ansoff Matrix	A product/market matrix that by considering ways to grow via existing products and new products, and in existing markets and new markets, provides four possible product-market combination suggesting four growth strategies: Market Penetration, Market Development, Product Development, Diversification.
Economies of Scale	Achievement of lower average cost per unit through a larger scale of production. Economies of scale can be accomplished because as production increases, the cost of producing each additional unit falls. Firms intending to enter overseas markets will have larger market base and save costs by producing on a scale that makes better use of resources.
Environmental Awareness	Concern about or well-informed interest in environment, for protecting it from damage of human activities.
Incoterms	The Incoterms rules or International Commercial terms are a series of pre-defined commercial terms published by the International Chamber of Commerce (ICC) widely used in international commercial transactions. A series of three-letter

	trade terms related to common sales practices, the Incoterms rules are intended primarily to clearly communicate the tasks, costs and risks associated with the transportation and delivery of goods.
Intellectual Property (IP)	Knowledge, creative ideas, or expressions of human mind that have commercial value and are protectable under copyright, patent, trademark and etc. from imitation.
Joint Venture	A formal arrangement between two or more companies to work towards on a particular business or project with formation of a new and separate entity.
Market led	In a market-led marketing strategy, a company seeks to determine what products a consumer might want, and then moves the company to develop those products; it asks, "What do consumers want? How can we satisfy this want?" and it relies heavily on market research.
Market Segment	A group of possible customers who are similar in their needs, age, education, etc.
Niche Market	A small area of trade within the economy, often involving specialized products.
Non-payment Risk	One of the principal risks which firm incur during international business is that their partner does not totally or only partially carry out his obligations, while they themselves keep their

	side of the engagement.
Product led	A product led marketing strategy involves first developing a product and then identifying markets or applications for that product.
Production Capacity	The maximum possible output that can be generated by a production plant in a unit of time (usually a year). Available production capacity should be evaluated before making decision on exporting, to determine whether; current production capacity sufficient to sell in new markets and the current capacity is expandable to meet market demand and cost.
SWOT analysis	A strategic planning method that involves specifying the objective of the business venture and identifying the internal and external factors that are favourable and unfavourable to achieve that objective, by evaluating Strengths (characteristics of the business that give it an advantage over others), Weaknesses/Limitations (characteristics that place the team at a disadvantage relative to others), Opportunities (external chances to improve performance, e.g. make greater profits, in the environment), and Threats (external elements in the environment that could cause trouble for the business or project) involved.
Vulnerability	Degree to which business enterprises, various operations and activities are sensitive to be harmed by ambiguous conditions in the external

environment and international markets.

ECOLIVE

**4. LABELING
STORAGE
PACKAGING
AND TRANSPORT**



4.1.1. Introduction

The current module „LABELLING, PACKAGING, STORAGE & TRANSPORT OF ORGANIC OLIVE OIL” aims at providing a thorough, detailed and useful guidance for the aforementioned issues. At the end of this training, the learner is expected to learn:

1. using terms of certification’s body and community’s logo for organic products,
2. compulsory indications on the label,
3. ensure that organic products are transported to other units, including wholesalers and retailers, only in appropriate packaging, containers or vehicles closed in such a manner that substitution of the content cannot be achieved without manipulation or damage of the seal,
4. shall know that for the storage of products, areas shall be managed in such a way as to ensure identification of lots and to avoid any mixing with or contamination by products and/or substances not in compliance with the organic production rules. Organic products shall be clearly identifiable at all times,
5. handling both non-organic products and organic products and the latter are stored in storage facilities in which also other agricultural products or foodstuffs are stored.

Regarding the structure of the content of this module, we will refer to the following issues: the use of terms that refer to the organic production of olive oil, labeling issues of organic olive oil, packaging of organic olive oil and managing the storage products.

4.1.2. Use of terms referring to organic production

The EU Organic logo

The basic organic production logo of the European Union (referred to in this paper as the EU organic logo) is sometimes also called “Euro-leaf”. It was introduced with the passing of the Commission Regulation (EU) No 271/2010 of 24 March 2010 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards the organic production logo of the European Union. The specific rules for colour, background, minimum size, shape, etc. are provided in Annex XI A of Regulation (EC) No 889/2008. Additionally, the European Commission has published a set of guidelines on the use of the new EU organic logo. The term of use for the EU organic logo provides more information on the use and the copyright related to the EU organic logo.

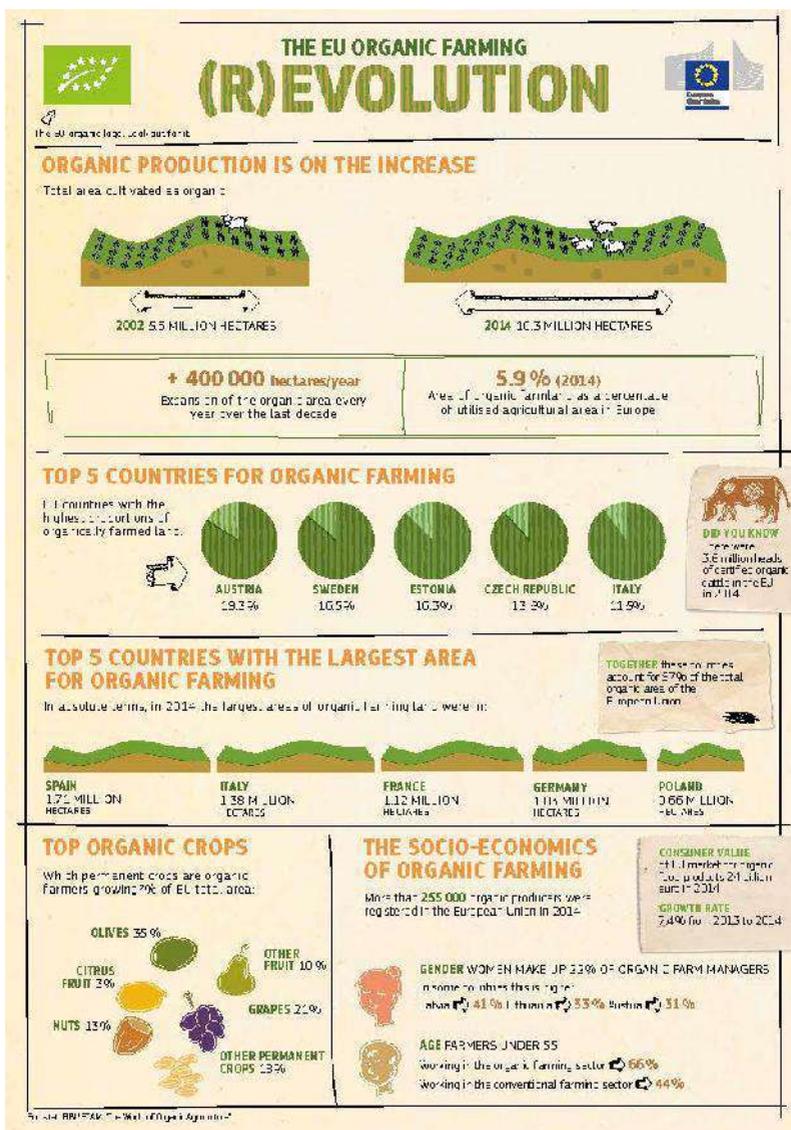
The logo and the labelling rules are an important part of the organic regulations. With this regulatory framework, the European Union provides conditions under which the organic sector can progress in the line with production and market developments, thus improving and reinforcing the EU organic farming standards and import and inspection requirements.

The main objective of the European logo is to make organic products easier to be identified by the consumers. Furthermore, it gives a visual identity to the organic farming sector and thus contributes to ensure overall coherence and a proper functioning of the internal market in this field.

The labelling rules facilitate controls by authorities and bodies designated or recognised in accordance with the EU Regulations on organic food and farming. They also clarify the obligations of economic operators in respect of marking the organic goods they produce. The common organic symbol is protected from being used on non-organic products throughout the EU. This enhances fair competition in the market, and of course, consumer protection.

The use of the logo and correct labelling is obligatory for all organic pre-packaged food produced within the European Union. In certain cases, it is also possible to use it on a voluntary basis. This means that non pre-packaged organic food produced within the EU or organic products imported from third countries might display the new logo. Next to the new EU organic logo, consumers are informed about the place where the agricultural raw material used in this product have been farmed and a code number of the control authorities is also displayed.

Infographic: the EU Organic Farming (R)evolution



Labelling, Packaging, Storage

The following are excerpts from relevant laws concerning the labelling, packaging and storage of organic products, according to the EU:

5.2 Labelling of transport packaging: Transport packaging or accompanying documents for organic products supplied to others than the final consumers (including mass caterers) or of organic bulk products may be labelled with the new EU organic logo. (Note: The labelling on transport packaging must comply primarily with the general provisions on packaging and transport of products to other operators or units as given in Article 31 of Regulation (EC) No 889/2008.)

5.3 Presentation and advertising The new EU organic logo may be used for presentation and advertising materials without using the obligatory indications given under 6.(according to Article 25 Point 1 of Regulation (EC) No 834/2007 and article 57 paragraph 2 of Regulation (EC) No 889/2008. For the definition of the "advertising" refer to Article 2 (m) of Regulation (EC) No 834/2007).

6. Additional compulsory requirements related to the labelling of organic products that carry the new EU organic logo

6.1 The code number of the control authority or control body: The code number of the control authority or control body shall appear in the same visual field as the logo (according to Article 58 Point 1(d) of Regulation (EC) No 889/2008). The product indicates the code number of the control authority or control body controlling the company, which was the last to prepare, process, pack and/or label the product (according to Article 24 Point 1 (a) of Regulation (EC) No 834/2007 and Article 2 (i),(k),(m) of Regulation (EC) No 834/2007).

6.1.1 Special case of retailers and brand owners There is different interpretation in different EU member states on which code number has to be used where the control authority or control body controlling the producer (who conducted the last processing) is different from the one controlling the distributor, retailer, brand owner (who did not conduct

the last processing): • In most countries the rule is interpreted directly. The code number of the control authority or control body controlling the producer who conducted the last processing is being used. The code number of the control authority or control body controlling the distributor, retailer, brand owner (who did not conduct last processing) is being put voluntarily and additionally to the above. • Alternatively in some countries, the code number of the control authority or control body controlling the distributor, retailer, brand owner as operator responsible for the placing of the product on the market is being used.

6.1.2 Transport packaging: When an operator transports organic products to another operator, including wholesalers and retailers, transport packages and/or accompanying documents (which can be undeniably linked with the packaging, container or vehicular transport of the product) should be labelled with the name and/or the code number of the control body or authority to which the transporting operator is subject to (according to Article 31 Point 1 of Regulation (EC) No 889/2008).

6.1.3 Presentation and advertising: In general, the code number of the control authority or control body is not required for advertising materials, in case of general information on the products' range and assortment, company's environment or company's organic orientation (according to definition of "advertising" to Article 2 (k) of Regulation (EC) No 834/2007).

7. Placing the EU organic logo and the other compulsory elements on the label

The EU organic logo, the code number and place of farming do not always have to be placed on the front side of the packaging material. They shall be marked in a conspicuous place in such a way as to be easily visible, clearly legible and indelible (according to Article 24 Point 2 of Regulation (EC) No 834/2007). If the EU organic logo is placed on the package twice, the code number and place of farming can be displayed only once.

8. Use of national and private logos for labelling and advertising organic products

National and private logos can be used on organic products next to the EU organic logo (according to Article 25 Point 2 of Regulation (EC) No 834/2007). The use of private/national logos is regulated by the individual private/national rules.

Use of logo for labelling for export to other countries: the logo use and labelling has to be done according to the reference standard of each country. For more info, visit: (NOP, JAS).

Japanese regulation page -

JAS: <https://www.youtube.com/watch?v=JNo0Kx3DW44&index=12&list=PL9CyUgkEnVPz4OlxTOvG7ee6Kq9-h9GCN>

USA regulation page - NOP: <https://www.ams.usda.gov/about-ams/programs-offices/national-organic-program>

4.1.3. Compulsory indications when community logo is used



Article 25 Organic production logos

The Community organic production logo may be used in the labelling, presentation and advertising of products which satisfy the requirements set out under this Regulation. The Community logo shall not be used in the case of in-conversion products and food as referred to in Article 23(4)(b) and (c). 2. National and private logos may be used in the labelling, presentation and advertising of products which satisfy the requirements set out under this Regulation. 3. The Commission shall, in accordance with the procedure referred to in Article 37(2), lay down specific criteria as regards presentation, composition, size and design of the Community logo.

Key questions

Is the use of the new EU organic logo compulsory?

Where the terms referred to in Article 23(1) of Regulation (EC) No 853/2007 are used (e.g: organic, bio, eco...), the EU organic logo is compulsory for the labelling and advertising of organic pre-packaged food products which satisfy the requirements set out under or pursuant

to Regulation (EC) No 834/2007, placed on the EU market. It should be underlined that although the use of the logo is compulsory where the terms referred to in Article 23(1) of Regulation (EC) No 834/2007 are used, the organic logo is not exclusive on the packaging: subject to the respect of the EU legislation, national and private labels may be used and can be displayed on organic products next to the Euro-leaf.

For which product categories is the new EU organic logo compulsory?

The use of the EU organic logo is compulsory for organic pre-packaged food produced within the European Union where the terms referring to organic production are used (see Article 24(1)(b) of Regulation (EC) No 834/2007).

For which product categories is the new EU organic logo voluntary?

It is also possible to use it on a voluntary basis for non-pre-packaged organic products produced within the Union and which satisfy the requirements set out under or pursuant to Regulation (EC) No 834/2007 or any organic products imported from third countries and recognised as equivalent in accordance with Regulation (EC) No 834/2007. Operators are not obliged to use the logo on organic products when those products are only placed on third countries' markets. In cases where the logo is used, the EU legal provisions must be respected, however.

For which products can the EU organic logo not be used?

EU organic logo cannot be used for a product which does not satisfy the requirements set out under Regulation (EC) No 834/2007. The EU organic logo shall not be used in the case of in-conversion products and food as referred to in Article 23(4)(b) and (c) of Regulation (EC) No 834/2007, i.e. containing less than 95% of organic ingredients. Products from the hunting and fishing of wild animals are not considered as organic production and cannot bear the EU logo.

Examples of use: Can the logo be used on packaging material of the following products (subject that they satisfy the requirements set out under Regulation (EC) No 834/2007) - Sardines in organic olive oil: NO - Organic farming salmon: YES - Organic wine: YES - Soup made from

organic vegetables: YES - Wool from organic sheep: NO - Milk from a dairy farm in conversion period: NO

When the logo is used, what additional information is obligatory?

Whenever the EU organic logo is used on a product, it always has to be accompanied by the code number of the control body and the place where the agricultural raw materials of which the product is composed have been farmed. The code number of the control body or control authority shall be placed in the same visual field as the EU organic logo. Indication of the place of farming should appear directly below the reference to the control body.

How should the code number be displayed?

The code number shall appear as follows: AB-CDE-999 where "AB" is the ISO code for the country where the controls take place, "CDE" is a term establishing a link with the organic production like "bio" or "eko" and "999" is the attributed reference number composed of 1 to 3 digits.

How should the indication of place of farming be displayed?

The indication of the place where the agricultural raw materials of which the product is composed have been farmed shall appear as follows: • 'EU Agriculture', where the agricultural raw material has been farmed in the EU, • 'non-EU Agriculture', where the agricultural raw material has been farmed in third countries according to the EU regulations, • 'EU/non-EU Agriculture', where part of the agricultural raw materials has been farmed in the Union and a part of it has been farmed in a third country. The indication 'EU' or 'non-EU' may be replaced or supplemented by a country in the case where all agricultural raw materials of which the product is composed have been farmed in that country.

For the abovementioned 'EU' or 'non-EU' indication, small quantities by weight of ingredients may be disregarded provided, that the total quantity of the disregarded ingredients does not exceed 2 % of the total quantity by weight of raw materials of agricultural origin.

Is it compulsory to indicate the code number and the place of farming on products where the EU organic logo is not used or cannot be used?

Yes. The code number of control bodies must appear on all products claiming to be organic, irrespective of the use of the logo. The place of farming is compulsory only when the logo is used.

Is it possible to include the old and the new EU organic logo on the same packaging?

No. The old logo was replaced by the new one (Commission Regulation (EC) No 889/2008, as amended by Commission Regulation (EU) No 271/2010 of 24 March 2010) and it is now obsolete. The use of the old logo was only accepted during the transitional period, which is now over. However, if the products in question are covered by Article 95(9) of Regulation No 889/2008, i.e. stocks of products produced, packaged and labelled before 1 July 2010 in accordance with the EU organic legislation, and if these products satisfy the requirements set out under the organic legislation in force, they can bear the old logo and, if desired by economic operators, also the new logo (e.g. added as sticker on a can or another product with a long shelf life).

Is there any database or catalogue of companies/products which are able to use the EU organic farming logo available on the website?

No. However you can find a list of approved control bodies and control authorities in charge of controls in the organic sector in the EU:

http://ec.europa.eu/agriculture/organic/consumer-trust/certification-andconfidence/controls-and-inspections/control-system/index_en.htm

These control bodies can be distinguished by the code number that is visible under the EU organic logo. By visiting the websites of these approved control bodies and control authorities you can access a list of operators and the products that they produce and which are certified as organic.

What are the technical aspects of placing the logo on the packaging?

For the technical aspects, please consult the user manual of the EU

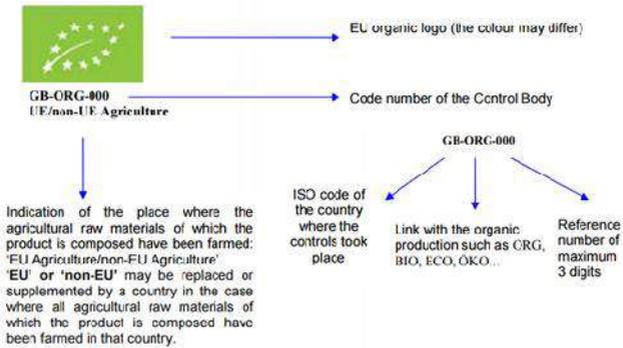
organic

logo:http://ec.europa.eu/agriculture/organic/documents/logo/user_manual_logo_en.pdf

ORGANIC FARMING
GOOD FOR NATURE,
GOOD FOR YOU.



12. Compulsory information – graphical example



4.1.4. Labelling of organic produce

As well as the standard list of ingredients and nutritional value figures, organic product labels should bear the name of the producer, processor or distributor who last handled the item. The code number of the national certification authority should also be on the label. Moreover, the Regulation (EU) No 1169/2011 on the provision of food information to consumers gives the minimum requirements on nutrition.

The organic logo guarantees that...

- The production respects nature.
- The products are produced in a sustainable way.
- The operators of organic production are controlled once per year by control bodies or control authorities to ensure that they respect all organic rules and all health and consumer protection rules.
- Farm animals are freely grazing in the open-air, and they are treated according to enhanced animal welfare conditions.
- Genetically modified organisms are not allowed in organic agriculture.
- For food, there are strict limitations to the use of chemical pesticides and fertilisers, growth regulators and antibiotics
- Organic agriculture strictly limits the use of food additives and processing aids and other inputs.
- Most of the inputs for farm production come from the farm itself using local resources and local knowledge.
- Each and every time you buy an organic product from your supermarket, or choose an organic wine at your favourite restaurant, you can be sure they were produced according to strict rules aimed at respecting the environment and animal welfare, the conformity of production to the rules assessed by independent inspectors, and product certified and labelled in case of conformity.

4.1.5. Infographic: the organic logo of the EU


 European Commission

THE ORGANIC LOGO OF THE EU

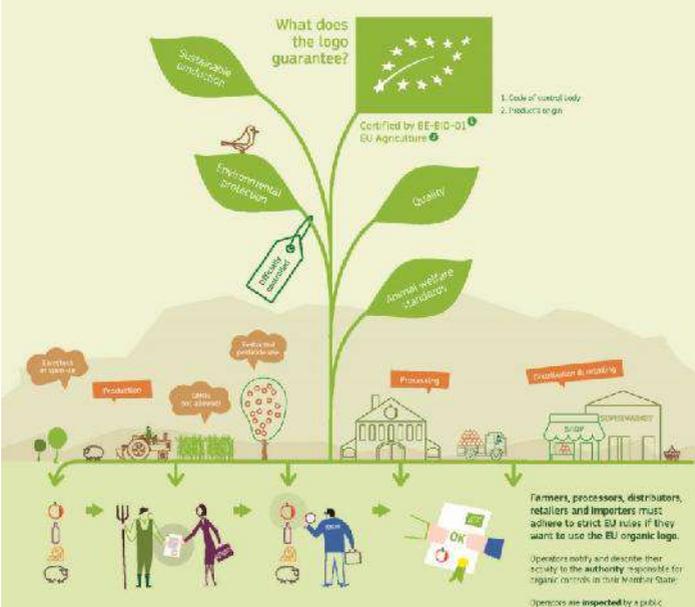
Organic farming is a way of producing food that seeks to respect the environment.
It applies to all kinds of products (eg. fruit, vegetables, meat, milk, wine, cheese, eggs, grains, coffee, chocolate, fish & seafood).

What does the logo guarantee?

- Sustainable production
- Environmental protection
- Animal welfare standards
- Quality

Certified by BE-BIO-01
EU Agriculture

1. Code of control body
2. Producers origin



Farmers, processors, distributors, retailers and importers must adhere to strict EU rules if they want to use the EU organic logo.

Operators notify and describe their activity to the **authority** responsible for organic controls in their Member State.

Operators are **inspected** by a public or private control body. If the result is positive, operators receive a certificate and can market their products as organic.

Operators are inspected at least **once per year** to ensure that they respect organic rules.

Whenever you buy organically certified food, you can be confident that it has been produced in accordance with strict EU environmental and animal welfare rules, and is checked regularly.

ec.europa.eu/agriculture/organic/

Agriculture and Rural Development

4.1.6. Packaging of organic olive oil

According to the rules of the European Union regarding the packaging of organic olive oil:

Commission Implementing Regulation (EU) No 29/2012 of 13 January 2012 on marketing standards for olive oil,

- **To guarantee** the authenticity of the olive oils sold, packaging for the retail trade should be small and have an adequate closing system.

However, the Member States should be allowed to authorise larger packaging for collective establishments.

- **As a result** of agricultural traditions and local extraction and blending practices directly marketable virgin olive oils may be of quite different taste and quality depending on their geographical origin. This may result in price differences within the same category that disturb the market.

There are no substantial differences linked to origin in other categories of edible olive oil, and so indicating the designation of origin on the immediate packaging of such oil may lead consumers to believe that quality differences do exist. In order not to distort the market in edible olive oils, an obligatory Union regime should therefore be established for designations of origin, which should be restricted to extra virgin and virgin olive oils, which satisfy precise conditions. Optional arrangements implemented until 2009 proved not to be sufficient to avoid misleading consumers as to the real characteristics of virgin oils in this regard. In addition, Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (5) established traceability rules, applicable since 1 January 2005. The experience gained by operators and administrations in this matter allowed making the labelling of the origin compulsory for extra virgin and virgin olive oil.

- **If the designation** of origin of virgin olive oil refers to the Union or a Member State, it should be borne in mind that not only the olives used

but also the extraction techniques and practices influence the quality and taste of the oil. The designation of origin must thus refer to the geographical area in which the olive oil was obtained, which is generally the area in which the oil was extracted from the olives. However, in certain cases the oil is extracted at a place that is not the same as that where the olives were harvested and this information should be stated on the packaging or labels attached to the packaging to ensure that consumers are not misled and the market in olive oil is not disturbed.

- **Oils as referred** to in Article 1(1) shall be presented to the final consumer in packaging of a maximum capacity of 5 litres. Such packaging shall be fitted with an opening system that can no longer be sealed after the first time it is opened and shall be labelled in accordance with Articles 3 to 6.

- **However**, in the case of oils intended for consumption in restaurants, hospitals, canteens and other similar collective establishments, the Member States may set a maximum capacity exceeding 5 litres for packaging depending on the type of establishment concerned.

- **For the purposes** of this Regulation, 'designation of origin' means reference to a geographical area on the packaging or the label attached to the packaging.

Special rules for transporting olive oil to other production or preparation units or storage premises

When transporting olive oil to other production or preparation units or storage premises, operators shall ensure that the following conditions are met:

- (a) during transport, organically produced olive oil, in-conversion olive oil, and non-organic olive oil shall be effectively physically separated;
- (b) vehicles or containers which have transported non-organic products may only be used to transport organic products if:
 - (i) suitable cleaning measures, the effectiveness of which has been

checked, have been carried out before commencing the transport of organic products and the operators record these operations;

- (ii) all appropriate measures are implemented, depending on the risks evaluated in accordance with control arrangements and, where necessary, operators shall guarantee that non-organic products cannot be placed on the market with an indication referring to organic production;
- (iii) the operator keep documentary records of such transport operations available for the control authority or control body;
- (c) the transport of finished organic olive oil shall be separated physically or in time from the transport of other finished products;
- (d) during transport, the quantity of products at the start and each individual quantity delivered in the course of a delivery round shall be recorded.

Storage of products

1. For the storage of products, areas shall be managed in such a way as to ensure identification of lots and to avoid any mixing with or contamination by products or substances not in compliance with the organic production rules. Organic
2. In case of organic plant and livestock production units, storage of input products other than those authorised for use in organic production pursuant to Article 19 is prohibited in the production unit.
4. Where operators handle both non-organic products and organic products and the latter are stored in storage facilities in which also other agricultural products or foodstuffs are stored:
 - (a) the organic products shall be kept separate from the other agricultural products or foodstuffs;
 - (b) every measure shall be taken to ensure identification of consignments and to avoid mixtures or exchanges with non-organic products;
 - (c) suitable cleaning measures, the effectiveness of which has been

checked, have been carried out before the storage of organic products and the operators shall record these operations.

4.1.7. Case study: Strakka Company Ltd.

Strakka Company Ltd.

Strakka has been engaged in organic olive cultivation since 2003.

It cultivates about 320 tons of organic olive oil. 290 tones are olives, 20 tons of citrus and 10 is with nuts.

The company cultivates the following varieties: Koroneiki, Kalamon and Cypriots and Amfissos. It produces about 15 to 20 tons of organic olive oil per year. It also process olives into packed ones for table consumption, of very different varieties.

The olive fruit are harvested using machines and combs. Olives are usually being transported the same day or no later than the next day to the oil mill for oil production.

The oil extraction is followed by the cold pressing method and extra virgin olive oil is produced.

The olive oil from the oil separator is placed in a stainless tank and transferred to the tank of the unit. It has 5 tanks of 5 tons each. Nitrogen gas is applied to prevent oxidation.

The oil is then transferred to a packaging plant for packaging. Transport is done with a stainless steel tank. Packaging is done in 0.5 liter glass bottles. Labels that comply with applicable law are then placed. In order for tourists to be able to transport them to their luggage, 0.5 litres cans can also be used.

The unit has its own packaging plant for the preparation and packaging of olives.

All products are removed from the unit with the required markings.

Below are the labels for this company.

Strakka olive oil is carefully blended from three varieties of olives. Our olives are milled immediately after harvesting to obtain a premium oil. The oil is extracted solely from the first cold pressing of the olives to ensure that only oil of the highest quality is used. Our oil is unfiltered so retains its full nutritional qualities and taste.

The Strakka Estate was founded during the period of Venetian rule in Cyprus, some five hundred years ago, and appears on Abraham Ortelius's map of 1573. The Estate has had a continuous history of olive oil production since. Situated near the medieval walled city of Nicosia, with views of the Troodos and Kyrenia mountains ranges, the Estate was acquired by the Laventis family in 1942 and has been organically farmed since 1998.



Το ελαιόλαδο Strakka παραχεται από τη προσεκτική ανάμιξη τριών ποικιλιών ελιών. Λίμως μετά τη συγκομιδή, οι ελιές μεταφέρονται στο υδρωλιθείο ούτως ώστε να ικαρισθούμε λάδι πρώτης ποιότητας. Παραχεται αποκλειστικά από την πρώτη ψυχρή έκθλιψη των ελαιοκάρπων δια να διασφαλιστεί ότι χρησιμοποιείται μόνο το λάδι με την υψηλότερη ποιότητα. Το λάδι μας είναι αφιλοφίριστο ούτως ώστε να διατηρή τις ιδιότητες του ιδιαιτέρως καλή γεύση του.

Το Αγρόκτημα Strakka ιδρύθηκε κατά την περίοδο της Ενετοκρατίας στην Κύπρο, πριν περίπου πεντακόσια χρόνια και εμφανίζεται στο χάρτη του Αβραάμ Ορτέλιου του 1573. Το Αγρόκτημα έχει μια συνεχή ιστορία στη παραγωγή ελαιολάδου από τότε. Βρίσκεται κοντά στη μεσαιωνική περιτοιμασμένη πόλη της Νίκους, με τη θέα του Τροόδου και τις οροσειρές της Κιρηνείας. Το Αγρόκτημα αποκτήθηκε από την οικογένεια Λαβεντίς το 1942 και καλλιέργηθηκε βιολογικά από το 1998.

Strakka



Organic
extra virgin
olive oil
Βιολογικό
εξαιρετικό
παρθένο
ελαιόλαδο

органический
Экстра-класс
оливковое
масло



500 ml
www.strakka.com

Strakka

Ελαιόλαδο ανώτερης κατηγορίας που παράγεται αποκλειστικά από ελιές σε μόνο με μηχανικές μέθοδους.
Superior quality olive oil produced directly from olives and solely by mechanical means

Κρατήστε το ψυγείο.
Cold pressed

Διατηρείται σε ήπιο σκοτεινό χώρο.
Store in cool & dark place

Απορροπεί 900 kcal ανά 100ml
Nutritional Information per 100ml

Ενέργεια/Energy	3518KJ/850Kcal
Λίπος/Lipid	99.5g
Χοληστερόλη/Cholesterol	1.0g
Νοξολιχόλη/μονοσατρώρες/Total saturated fatty acids	62.6g
Πολυακόρεστα/πολυακόρεστα/Unsaturated fatty acids	6.6g
Υδατάνθρακες/Carbohydrates	0g
Εκ των οποίων από υδατάνθρακες/Sugars	0g
Πρωτεΐνες/Proteins	0g
Αλάτι/Salt	0g

Οι πολυακόρεστοι του θελογενούς χημεικού περιόλου η υδατάνθρακες, επιβλαβών στην αρτηριακή των λιπιδίων του αίματος από το 25% ελαττώσεως. Τα καρδιακή ανεπάρκεια εξισορροπείται με την πρώτη πρόσληψη 20g διακοσμήσεων.

Strakka olive oil polyphenols contribute to the protection of blood lipids from oxidative stress. The beneficial effect is obtained with a daily intake of 20g of olive oil.

Παράχεται στην Κύπρο από τη Strakka Ltd, στον Λαυρέτιο, Τ.Θ. 1212 Λαυκατάνια 2340

Produced in Cyprus by Strakka Ltd
Kato Deftera, P.O.Box 1212, Laikaatania 2340

Email: strakka@cytanet.com.cy

CERTIFICATION BODY
OF ANTIPOLOS ΕΛΛΗΝΟΥ
ΠΙΣΤΟΠΟΙΗΣΗ



CY 310 001
ΑΝΤΙΠΟΛΟΣ ΕΛΛΗΝΟΥ
ΕΙΣΡΕΥΣΗ ΚΑΠΝΟΥ ΟΕ



Αναζητήστε κατά προσέγγιση αριθμό barcode.

INGREDIENTS
Organic green olives in brine and vinegar
Net weight: 200 gr

Contains no artificial additives or preservatives
Store in a cool, dry place
Produced in Cyprus by:
Strakka Ltd
Kato Deffera - P.O. Box 12121
2340 Lakatamia - Cyprus
Tel.: 00357 - 22621455
Fax: 00357 - 22623656
E-mail: strakkaltdcyoffice@cytanet.com.cy




**Organic Green Olives
AMFISSIS**

NUTRITIONAL INFORMATION PER 100 gr.
Energy: 175 kcal - 735kJ
Proteins: 1.5 gr.
Fats: 15.1 gr.
Carbohydrates: 7.0 gr.

IN VACUUM

Ideal as an appetizer, used in green salads and accompaniment.

These green olives Amfissis with brine and vinegar are traditionally made in Cyprus. They have a pleasant taste and is an excellent companion with the most foods.



CY BIO 001
CYPRUS AGRICULTURE



291606 000258

ΠΕΡΙΕΧΟΜΕΝΑ
Βιολογικές Ελιές Πράσινες
Αμφίσισης με άλμη και ξίδι
Καθαρό Βάρος: 200 γρ
Δεν περιέχει χημικά συντηρητικά
Αποθηκεύεται σε δροσερό & ξηρό μέρος
Κυπριακό προϊόν από:
ΣΤΡΑΚΚΑ ΛΤΔ
Κ. Δεφερά - Τ.Κ. 12121
2340 Λακατάμια - ΚΥΠΡΟΣ
Τηλ.: 00357 - 22621455
Φαξ: 00357 - 22623656
E-mail: strakkaltdcyoffice@cytanet.com.cy




**ΒΙΟΛΟΓΙΚΕΣ
Πράσινες Σχιστές Ελιές
ΑΜΦΙΣΣΗΣ**

ΘΡΕΠΤΙΚΕΣ ΠΛΗΡΟΦΟΡΙΕΣ ΔΙΑ 100 γρ.
ΕΝΕΡΓΕΙΑ: 175 kcal - 735kJ
ΠΡΟΤΕΙΝΕΣ: 1.5 γρ.
ΥΔΑΤΑΝΘΡΑΚΕΣ: 7.0 γρ.
ΛΙΠΑΡΑ: 15.0 γρ.

EN KENO AERIOZ

Ιδανικό σνακ, χρήση σε πράσινες σαλάτες, αποτελεί εξαιρετικό συνοδευτικό γεύμα.

Οι Σχιστές Πράσινες Ελιές Αμφίσισης, σε άλμη, και ξίδι είναι παραδοσιακές στην Κύπρο. Έχουν ευχάριστη γεύση και συνδυάζουν τα καλύτερα φυτά.

Best before:



CY BIO 001
ΓΕΩΡΓΙΑ ΚΥΠΡΟΥ CY

Production unit that makes labeling, packaging, storing and transporting organic olive oil will be displayed (Novel Agro).-advantages of that unit: all processes are controlled by the unit. Can directly ensure traceability of the products and instantly take action in case of an error.

- Production unit that uses subcontractor for some of her activities like STRAKKA LTD, which even though produce, label and market organic olive oil, yet uses subcontractor for bottling and packaging. Disadvantage: the unit cannot directly interfere in case a problem arises for her products.

4.1.8. Further links to consider

The below links are concerned with different EU regulations regarding several aspects of organic olive oil production.

[On marketing standards for organic olive oil](#)

[Organic production and labelling of organic products with regard to organic production, labelling and control](#)

[Organization of the markets in agricultural products](#)

4.1.9. References

http://www.ifoam-eu.org/sites/default/files/page/files/ifoameu_reg_new_organic_logo_dossier_201212.pdf

https://ec.europa.eu/agriculture/organic/downloads/logo_en

https://ec.europa.eu/agriculture/organic/sites/orgfarming/files/docs/body/organic_logo-faq_en.pdf

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<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0029>

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https://ec.europa.eu/agriculture/organic/consumer-trust/certification-and-confidence/the-organic-logo-guarantees_en

<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014PC0180>

ECOLIVE

**5. LOCAL
OLIVE
VARIETIES**



5.1. Local Olive Varieties, Cyprus

The olive tree has co-existed with the inhabitants of Cyprus from the Neolithic period (6th millennium B.C.) to the present day, not only in the countryside but also in the towns. One can see in the gardens of houses, side by side the beloved traditional trees of Cyprus: the lemon tree and the olive tree. The cultivation of the olive tree began during the 2nd millennium B.C. but the earliest evidence of production of olive oil on the island goes back to the end of the 13th century B.C., the period to which the oldest olive presses that have been discovered in settlements and temples date back (Hadjisavvas 1992 and Hadjisavvas 1996, 59-63), In antiquity Cyprus was well-known as a place rich in olive trees and olive oil, *evelaios* according to Strabo, and Cypriot olive oil was much sought after as being light and easily digestible (Strabo 14. 6 .5). The olive tree is hardy and long-lived (Fig. 1). There are some very old olive trees in Cyprus, their trunks full of roomy hollows. The so called *frankoelies* (Frankish olives) are thought to go back to the period of Frankish rule (1191-1489), while another variety of olive tree is called *apostolitzi* (apostolic) because according to tradition these trees sprang from the olive stones thrown on the ground by the Apostles Paul and Barnabas during their stay on Cyprus (Aristidou 1986, 53).

In an economy that was primarily agricultural, like that of Cyprus, olive oil was only second to wheat as a food staple. Therefore, interregional exchanges were essential and itinerant merchants and even producers would exchange olive oil with grain.

In the traditional society of Cyprus, especially in rural areas, production remained at the preindustrial level at least until the mid 20th century. Therefore, the year's provision in olives and olive oil, was a real struggle, involving the cultivation of the trees, the collection of the fruit and the extraction of olive oil in the pre-

industrial olive mills and presses.

Crucial for production is the flowering season in the spring, when the fruit is small and tender. The harvesting of the fruit began in August with the picking of the green olives which would become tsakkistes (crushed).

The process of extracting the oil was laborious and was done in two stages at special installations which in some areas were open air but in others housed in buildings. The first stage was the crushing of the fruit with a cylindrical millstone which turned in an upright position in a circular stone basin, the skoutellin tou milou. The millstone was turned by pushing the pole, i.e. the beam which formed the horizontal axis of the millstone. This was done by men or animals.

The most characteristic Cypriot olive is the tsakkisti (Fig. 5), which is prepared as follows: they crush lightly the green olives with a stone and cover them with water which is changed twice a day, until the bitterness has gone. Then they put the olives in bottles with brine and lemon juice. Before serving, they are prepared with finely chopped garlic, crushed coriander seeds, olive oil, thin slices of lemon and lemon juice (Evangelatou, 35-36).

Mavrolado, black oil, had a stronger taste and smell, and was also heavier than the normal olive oil. To produce mavrolado they picked the olives while they were still green, cleaned them and scalded them for a short time in water in a copper cauldron until they were soft but not soggy. Then they strained them and spread them out to dry but not to shrivel. They crushed them in the press without water and the oil which came out was left to settle in a tank for 40 days (Fiouri, under publication). The black oil, produced mainly in Paphos and the Karpasia, is produced in only small quantities today, despite the appreciation felt for it by gourmards. The use of plenty of oil was a sign of prosperity and generosity.

Olive oil continues to have an important place in today's diet, enhanced constantly by a steady flow of information about its beneficial qualities, which do not hold for mavrolado. Despite the fact that in recent decades various vegetable oils have been in widespread use, olive oil remains in the minds of Cypriots as the "good oil". As well as Cypriot oil, which is exported abroad, imported oil, mainly from Greece, is also consumed. According to data from the Statistics Service of the Ministry of Finance, 12,219 kilos were imported into Cyprus in 2002 and 25,976 kilos in 2003. In the same years the export of Cypriot olive oil reached 766,791 and 1,572,975 kilos respectively.

In 2003-04 local production of olive oil was 4,500 tons (1000 kilos per ton) and in 2004-05, 6,000 tons. It is worthy of mention that, despite the abundance of oil on the market, the Cypriot still aspires today to cultivate his small inherited olive grove or even the few olive trees in his garden or yard. If one calculates the cost of labour for harvesting and the fees at the olive mill, this enterprise is economically unprofitable. Thus, usually the family and friends are mobilised for the harvesting and they themselves take the fruit to the mills, which are now modern and automatic.

Local varieties of olives in Cyprus

The choice of the variety for installing a new grove depends on many factors. An important selection criterion is the intended use of the fruit is used, eg for the production of olive oil, table olives or both. Moreover, consumer preferences can indicate trends and directions of the crop. The vividness and manner of deployment of each variety define the applied planting system. Finally, the specific conditions of the grove (microclimate: frosts, prevailing winds, humidity, availability and quality of irrigation water), and the sensitivity /

resistance of the variety to pests and diseases should be considered. Depending on the weight of the fruit, different varieties of olives are divided into three categories: less fruits, with fruit weight up to 2.6 grams, mesocarp, between 2.7 and 4.2 grams and Large fruited, with fruit weight over 4.3 grams.

In Cyprus all three categories of varieties are grown. The most important are described below:

5.1.1.Cypriot ladoelia

Belongs to mesocarp varieties is the main variety grown in Cyprus. It is old variety, adapted to high temperatures and low soil moisture and grows in different soil types. H production is not stable, because alternate bearing and significantly affected by soil moisture and weather conditions during flowering and fruit set. The flowering and fertilization affected by adverse weather conditions, such as south winds, sirocco, clouds, fog and high humidity. H fructification negatively affected by damp and warm winds, fog and drought. The tree of Cyprus ladoelias develops a moderate height and gets a sphere with a diameter of six to eight meters. Presents blossom dropping, but grows well. In each inflorescence tie one to three fruits. It is early maturing variety and the fruit begins in the lowlands around the end of October and beginning of November, while the hilly end November-early December. The fruit preserved quite well on the tree after ripening. The oil content of the fruit is around 22%, so basically used for the production of oil, but also for canning as green and as black. But the main feature of the Cypriot ladoelias is the flavour of the oil, so it is considered as one of the most aromatic varieties of olives in the world.

It is resistant to the wart disease of olives, which is caused by the bacterium *Pseudomonas savastanoi*. It is also resistant to adverse conditions, such as the salinity of the irrigation water and drought, but easily attacked by the olive fly, the *P. oleae*, the rynchiti and leaf spot. In irrigated plantations attack occurs and the vertisilio. As the Cypriot variety cultivated since ancient times, they have been collected and studied different variants. The study conducted found great genetic variability and identified clones with varied interests from growing view features.



5.1.2. Koroneiki (Lianolia)

It is a Greek variety and was introduced in Cyprus around 1977. It belongs to Small fruited and cultivated for its oil that is thin, with good flavor and aroma with good stability and sustainability. It is the predominant variety in Crete and bears the local name Psilolia. It is a productive tree and it fructifies firmly with overproduction each second year. With a little care and related pruning may well bear fruit every year. It is considered the best variety for oil production. The tree is Koroneiki plagioklado, bushy, hemispherical shape gets down to the height of eight to ten meters with a diameter of six to eight meters if grown in fertile soil and watered. In each inflorescence tie three to five fruits.

It rapidly enters the production (3-4 years). It has minimum requirements in cold, blooms in the last ten days of April and has abundant and constant flowering. Usually presents no blossom dropping and it grows well. The fruit is small (average weight 0.6 to 1.5 grams), with one side slightly curved and bears short nipple. It is of medium range, the fruit ripens in November-December. The maturity is extended until January. Keep tightly on the tree after ripening. The core to flesh ratio is 5 to 6.6: 1, and the oil content may reach 15 to 27%, depending on the culture conditions.

Exclusively used for oil production. It is resistant to drought and strong winds. It is resistant to cold, so cold strong winds can cause damage. In Crete and other Greek regions usually grown in rainfed cultivation form, in areas where rainfall is over 450 mm and evenly distributed over time. In our country the crop under rainfed conditions has given mixed results. At high altitudes not easily grow and therefore the cultivation should be limited to areas with an altitude below 500 meters. The tree and its fruit is not easily affected by *P. oleae*, the fruit fly, the vertisilio and leaf spot, however, affected by rynchiti, the Vamvakado and olive cancer. Used as a pollinator of many other varieties and variety is moderately suitable for installation hyperintense linear plantings.



5.1.3.Amfissa

It is fruited table olive variety, Greek olive variety known by various names, such as 'Chontroelia' Konservolia, Mafroelia etc. The brand name that prevailed is "Amfissa". It is quite strong and productive tree. In fertile irrigated soils with good drainage exceeds 100 kg fruit per tree aged 12 years and over. In Pelion-Volos areas and around the city of Amfissa, which is found in large areas, usually grown under rainfed conditions, provided that the annual rainfall is less than 500 mm. Tree height is six a.m. to ten a.m. measures and crown five to eight meters in diameter. It orthokladi but pruning limited upward direction.

The fruit is large (5.5 to 8 grams), elliptical / oval with stones large and elliptical. It ripens from mid-November to February. The core to flesh ratio is 10: 1. The color from bright green turns to red and full maturity kyanomafro. H flesh is somewhat hard to drier soils, and softer-fertile moist soil. H oil content is about 16%, depending on the region and the prevailing conditions. Considered the best variety for making different types of olives, green and black. It shows good resistance to low temperatures. It grows up to 600 meters. Therefore cultivated both in the plains, and in the semi. But improved fruit quality, which excels in color, aroma and flavor, guaranteed by trees grown in hilly areas. Prefers argiloasvestodi, the argiloammodi and cool soils. O fruit of easily attacked by the olive fly, the *P. oleae* and *rynychiti* while the tree shows a great vulnerability in *vertitsilio*. Many times the damage from *vertitsilio* are so large so whole trees, even at full production, to dry up.

5.1.4.Kalamata

Belongs to Large fruited, table, Greek olive varieties and is grown in large area around the city of Kalamata (from which it took its name) and to a lesser extent, in other regions of Greece. The tree develops lively orthokladi vegetation and has a moderate height. The leaves are very broad, hard corrugated and folded edges of the top surface and bottom dark green greyish. O fruit is large, weighing five to six grams, pointed and curved at the base, like grape berry "Aetonychi", so called Aetonychia. H flesh is tough, asproiodis. The stone is large, elongated and curved like the wrist. The flesh to stone ratio is 8-10: 1. The color of the fruit is from pale reddish and maturation dark black, maintained in canning. It matures in November - December. H content of the oil is 17 to 19% and is of excellent quality. It is edible olive exploited for the production of high quality black olives. Generally, it is fine, durable and moderately productive variety. It is demanding in water, but withstands soil salinity. In years of high production needs irrigation until the beginning of ripening fruit to have sufficient size and prevent fruit shrinkage. To prevent overproduction and small fruit, recommended strict pruning year provided great production. Cultivated both in the plains, and in the hilly up to 600 meters, but better quality fruits provided by trees in upland areas. It is resistant to leaf spot and wart disease of olive in attacks by the olive fly and moderately resistant vertitsiliosi.



5.1.5. Manzanilo

It is a Spanish, fruited dessert variety. It is highly productive, but exhibits the phenomenon of biennial bearing. The average annual production per tree, at the age of 12 years and over, is more than 60 pounds. In Cyprus it began systematically growing in recent years, with very good results. The tree develops vigorous vegetation and medium height (8-10 meters). The arms are upright. The secondary branches are horizontal and the tree is orthoklado. The leaves are narrow and moderately, lanceolate, oblong. The fruit is round average weight 4-5.5 grams and resembles a small apple, from which it got its name (Manzanilo in Spanish means small apple). The color is bright green and turns black when ripe. H content of the oil is approximately 18%. The flesh to stone ratio is 8.2: 1 is a dual use variety because the fruit canned, but also used for oil. For the production of table olives the fruit can be harvested in two stages. At first harvested olives that canned green, just the deep fruit green color becoming pale yellow.

In the second stage harvested olives to be canned black when the black color deepened up to 2/3 of the flesh. Cultivated both in the plains and in imiorines areas, facing south, since it is not resistant to low temperatures. Showing strong chlorosis on leaves in calcareous soils and easily offended by vertitsilio, the fruit fly, the *P. oleae* and rynchiti.



5.1.6. Pikoual

It is a Spanish variety, which is grown in vast areas in the region of the Spanish city Jaen, for olive oil production. In our country began to be cultivated systematically after 1985, with very good results. It is quite productive variety with fixed returns every year. The production per tree in fertile irrigated land in accordance with the Spanish data, more than 80 pounds of grain a year at the age of 12 years. The tree develops a medium height and is orthoklado. The kyliindrokoniko shape of the tree and the size of the wrist help mechanical harvesting. H variety Pikoual is mesocarp, Medium, and the proportion of the fruit in oil exceeds 21%. Leaves are medium, elongated, light green on top. O fruit is spherical or ovoid, with a greenish color and glossy black in maturity. Although elaiopoisimi variety, however, it can be used as a table in green or black. Its oil Pikoual variety has high stability and is not easily oxidized because of the high oleic acid percentage. It is resistant to wart disease anthracnose and olives, but easily attacked by the olive fly, the P. oleae and rynchiti, leaf spot and vertitsilio. Because of the dense foliage and the strength of the winds, the Pikoual can be used as a wind deflector. It is resistant to cold, salinity, and excessive soil moisture, but sensitive to drought and calcareous soils.



5.1.7. Other varieties

The above varieties are the most widespread in Cyprus. But there are several others are cultivated in smaller numbers and others which were imported from abroad. Among these varieties are the following, which seems to have a commercial value and thrive in our country, such as table, or Kortal Sevillano and Koukos, and elaiopoiisimes Sant Agustin, Askolana, Pisiolin Carol, Chotziplanka and others. Interestingly, in recent years also acquire new clones and varieties better adapted to the dense planting system. Such is the Arbequina i-18, the Arbosana i-43 and clone the Koroneiki i-38. Oi varieties consistently yield high quantities, they are slow-growing and soon enter production. The Arbequina i-18 is the earliest Arbosana i-43 and oil has a fruity taste that is not bitter. The Arbosana i- 43 is 4 weeks imported later, with oil more bitter and spicy. Koroneiki i-38 is vivid between the three options and difficult to handle, sensitive to cold, but produces faster maximum yields and is quite resistant to leaf spot. The oil is of high quality, high durability and intimate flavor to the Cypriot public. The research work continues and new options have become available more recently, such as Chiquitita and Vos one.

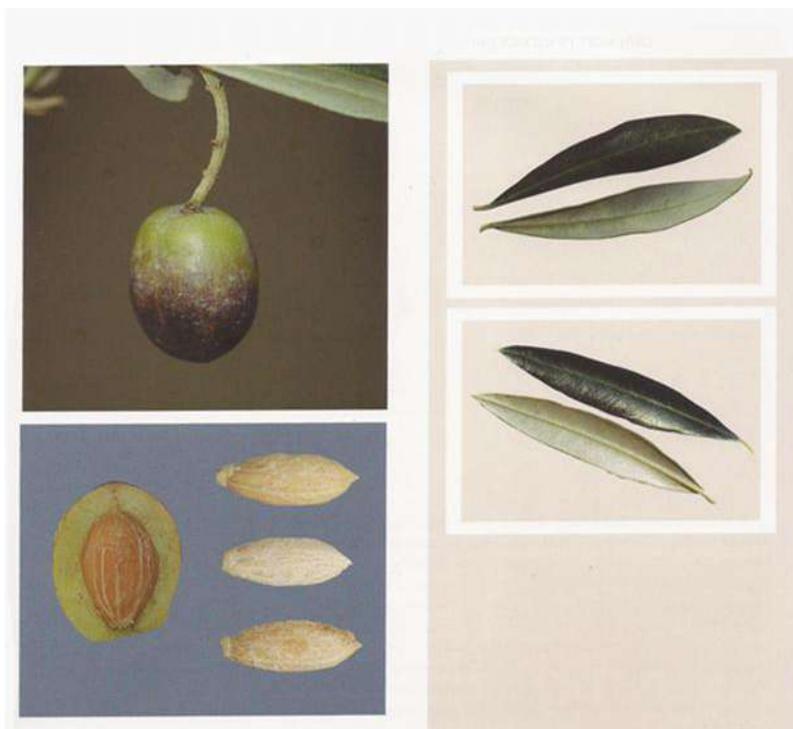
5.2.LOCAL OLIVE VARITIES

KEFALONIA AND ITHACA ISLANDS

5.2. Local Olive Varieties, Greece (Kefalonia and Ithaca Islands).

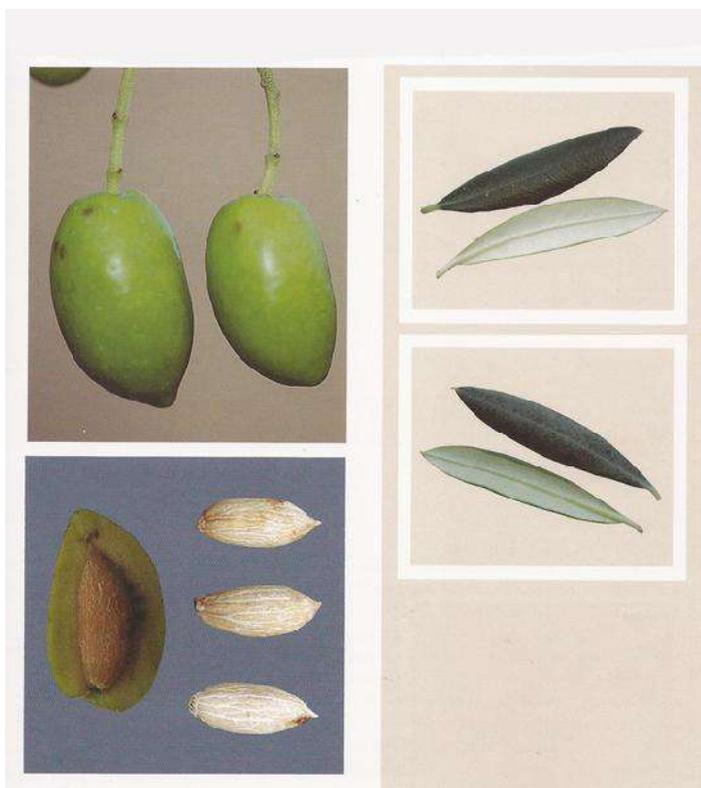
5.2.1. Kefalonian Local

The most common and widespread variety throughout the island of Kefalonia. The cultivation outside Kefalonia has not been confirmed. Small fruit variety suitable for olive oil production. The fruits are oval shaped with teat and grow 1 to 6 in bunches much like koroneiki variety, apart from the fact that they mature earlier (harvesting period October to end of November) and are less elongated. The fruits weight is 0.6 – 1.3 gr (~0.9 gr). It's yield is 20-25%. It is considered a productive variety, resistant to wind damage but sensitive to the Olive Fruit Fly (*Dacus oleae*).



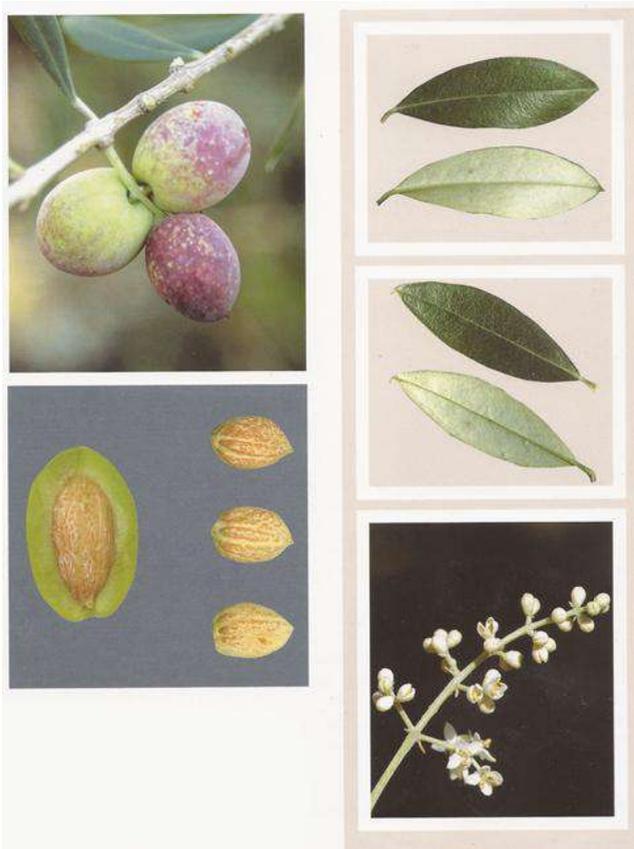
5.2.2.Kefalonian Korfolia

Cultivated sporadically on the island of Kefalonia apart from the area of “Mantzavinata” in which it constitutes 60% of the cultivated varieties. The cultivation outside Kefalonia has not been confirmed. Small fruit variety suitable for good quality olive oil production. The fruits are cylindrical-conical shaped with characteristic teat , the fruits are bigger and more elongated from the “Local Kefalonian” variety. (harvesting period November) The fruits weight is 0.8 – 2.1 gr (~1.5 gr). It's yield, resistances and sensitivities are unknown.



5.2.3. Ithaca Variety

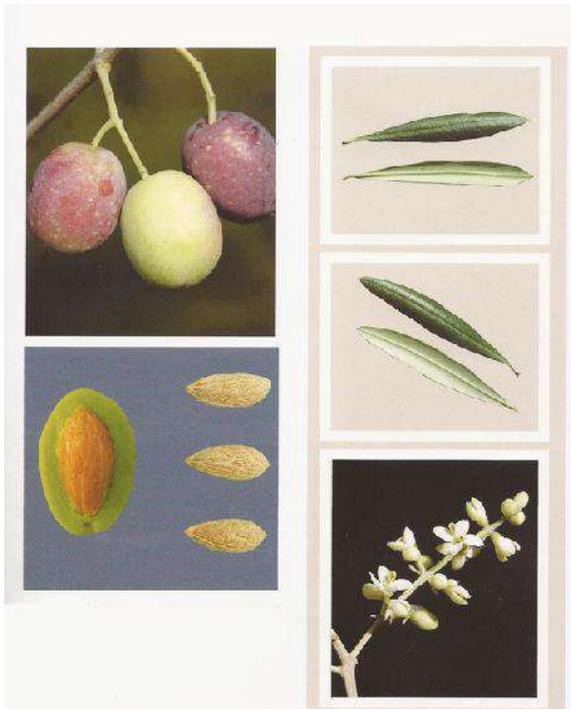
Cultivated sporadically on the island of Kefalonia apart from the area of “Mantzavinata” in which it constitutes 60% of the cultivated varieties. The cultivation outside Kefalonia has not been confirmed. Small fruit variety suitable for good quality olive oil production. The fruits are cylindrical-conical shaped with characteristic teat, the fruits are bigger and more elongated from the “Local Kefalonian” variety. (harvesting period November) The fruits weight is 0.8 – 2.1 gr (~1.5 gr). It's yield, resistances and sensitivities are unknown.



5.2.4. Ithacian Plexidenia

ENDANGERED. Cultivated sporadically (very small number of trees) on the island of Ithaca. Small fruit variety suitable for good quality olive oil production.

The fruits are cylindrical-conical shaped, the fruits are bigger than the local "Ithaca" variety. (harvesting period end of November – mid December) The fruits weight is 1.2 – 3.5 gr (~2.1 gr). It's yield is unknown but it is considered a productive variety with a constant fruit production, which is also confirmed by results of experimental plantations of new trees. It is also considered resistant to drought and moderately resistant to Olive Leaf Spot (*Spilocaea oleagina*) and the Olive Fruit Fly (*Dacus oleae*).



5.3.LOCAL OLIVE VARITIES

ITALY

5.3. Local Olive Varieties, Italy

5.3.1. TONDA IBLEA



Geographical and Historical Information: Tonda Iblea is cultivated in Sicily south-east and central between the provinces of Ragusa, Syracuse, Catania and Enna (Sicily-Italy). The cultivar is popular for excellent extra virgin olive oil and used as a table cultivar.

Cultivation and native range: The cultivar is a native of Ragusa (Chiaromonte Gulfi), Syracuse (Buccheri, Ferla, Palazzolo Acreide) and Catania (Caltagirone, Grammichele and Vizzini), located in the South Est of Sicily.

Olive tree and drupes' Morphological:

VARIETY 'SELECTED IN SICILY AND GROWN ecotypes: Cetrala e Tonda

Organoleptic and sensory characteristics: The extra virgin olive oil produced is characterized by its fruity scent of medium intensity olive oil, accompanied by green tomato notes with hints of bitter almond and tomato leaf, with flavors of spicy and bitter.

Product specification of Extra virgin Olive Oil PDO: Extra virgin olive oil PDO "Monti Iblei" and extra virgin olive oil PDO "Monte Etna"

Use in local food production: The oil is typically used raw to dress soups of legumes and cereals and red meat.

Description:The variety Tonda Iblea, in Ragusa's area, is present in the municipalities of Chiaramonte Gulfi, Giarratana, Comiso, Acate and in the upper part, borders the municipalities of Ragusa and Modica. It is a local ecotype with unique characters, which cannot be found in areas other than the Iblei Mountains. Although the name evokes the sphericity of the fruit, this cultivar produces elliptical drupe. The tree is vigorous and wailing; flowers are self-sterile (phenomenon of autoincompatibility); Using fruit-pollination, fruit is guaranteed by the presence of plants of Nocellara etnea, Biancolilla and Moresca in plants, which, in fact, act as pollinators; The fruit at complete maturation takes on a violet coloring; The fruit can reach a size of about 3.5 cm in diameter and a unit weight of about 12 g.



For these characteristics and for the excellent pulp-core ratio, the Tonda Iblea is well suited for both olive and black olives for sale in the sale and for the production of olive oil.

In fact, the cultivar is renowned for the quality of the oil, referring to the category of intense fruity with the predominance of the spicy on the apple. The oil of "Tonda Iblea" alone is one of the most beautiful among the monovarietal oils produced in Italy. The typical organoleptic characteristic of the variety is the smell of green tomato, very evident in olives coming from high hillside areas. The color is green tending to intense and despite the prevalent note of spicy, it has a remarkable harmony between the olfactory and taste sensations. The cultivar, along with other typical of the Iblean territory, is the varietal base of DOP Monti Iblei oils.



5.3.2.BIANCOLILLA



Geographical and Historical Information: We identify many different ecotypes with the name "Biancolilla" , characterized by strong color attenuation (which turns white) prior to coloring of the fruit which may, during ripening, a purplish color. In Sicily center-west, there is the presence of an accession called Biancolilla Caltabellotta (or commonly Buscionetto) while in the central-eastern Sicily only a call Biancolilla.

Cultivation and native range: Widespread in almost all of Sicily.

Olive tree and drupes' Morphological:

VARIETY 'SELECTED IN SICILY AND GROWN ecotypes: Biancuzza, Janculidda

Organoleptic and sensory characteristics: The extra virgin olive oil produced with distinctive fruity odor intensity of light oil, accompanied by notes of almond, sometimes accompanied by hints

of artichoke, grass-green leaf and tomato, with a predominance of sweet at the expense of bitter and spicy.

Product specification of Extra virgin Olive Oil PDO: Extra virgin olive oil PDO "Monte Etna", extra virgin olive oil PDO "Valle del Belice", extra virgin olive oil PDO "Val di Mazara", extra virgin olive oil PDO "Monti Iblei"

Use in local food production: The oil is typically used raw for seasoning white meat, fish and salads.



Description: This name indicates a cultivar-population in which the existence of different genotypes (about 6) has been established, accumulated by the characteristic aptitude of the fruit to turn from intense green to very pale green with the approximation of the maturation, then take red-violet coloring. The cultivar is widespread in most olive groves in western Sicily, as well as in olive cultivation in South-eastern Sicily. The tree has modest vigor, with wailing behavior, it has quite flexible branches that in the years of the charge, under the weight of the fruit bend by making the hair a procombe. The autochthonous cultivar is generally polluted by Nocellara del Belice, Giarraffa, and Ogliarola messinese. The high affluence of flowers, even within the same flowers, is manifested

with typical clusters of inflorescence. The fruits, medium in size, have pedunculate attachment sufficiently strong to not give rise to obvious phenomena of pre-harvested cobs. The cultivar, with intermittent maturation, shows high productivity, short unproductive phase and discrete cold resistance.

5.3.3.MORESCA



Geographical and Historical Information: The Moresca is a widespread cultivar in Central and Eastern Sicily, where it falls within the permissible range for the production of the PDO oils "Monti Iblei". In addition to the production of oil, the fruits are used for the preparation of black olives in dry salt.

Cultivation and native range: The cultivar is a native of south-eastern Sicily and is found in cultivation in the provinces of Catania, Siracusa, Ragusa, Enna and Caltanissetta.

VARIETY 'SELECTED IN SICILY AND GROWN ecotypes: Biancuzza, Janculidda

Organoleptic and sensory characteristics: The extra virgin olive oil produced is characterized by its fruity smell of very intense olive oil, accompanied by the typical notes of almond and sometimes the subtle hints of ripe or green apple, and grass-leaf, with a predominance of sull'amaro sweet and spicy.

Product specification of Extra virgin Olive Oil PDO: Extra virgin olive oil PDO "Monte Etna", extra virgin olive oil PDO "Monti Iblei".

Use in local food production: The oil is typically used raw to dress red meat, white fish and soups.

Description:The Moresca cultivar is widely cultivated in the provinces of Ragusa, Enna and Catania. In the province of Ragusa the largest production area of the variety is that of Modica, to a lesser extent are also concerned the municipalities of Ispica, Pozzallo, Scicli, Comiso and Vittoria, although it is present on all the rest of the provincial territory.

The Moresca cultivar, early-mature and scalar cultivar, produces medium to large sized fruits with modest strength in the pendulum, factors which, overall, are responsible for a significant loss of product for susceptibility to early fly and crawl attacks pre-harvest.

The ripening drupe reaches a perfect black color.

Variety, also self-catering given by the phenomenon of self-incompatibility, uses cross-pollination and produces in the presence of plants of Biancolilla, Tonda Iblea and Nocellara etnea. The tree, on average, has an expansive growth. The yield in oil is medium-low and the oil has a modest content of oleic acid. The oil obtained from olives of Moorish varieties is characterized by light fruity, delicate, sweet taste. A salient character of the oil is related to the aftertaste

of artichoke that is more or less marked depending on the altitude of the olive groves.



5.3.4. NOCELLARA DEL BELICE



Geographical and Historical Information: Nocellara del Belice is one of the most important cultivars of western Sicily, especially in Trapani. The cultivar comes into varietal basis for PDO recognized in western Sicily for the production of oil, and also appears to be the only cultivar PDO recognized for olive cultivation for the table and, therefore, the direct consumption.

Cultivation and native range: Cultivated in the provinces of Trapani and Agrigento, it appears to be the predominant variety of the Belice valley.

VARIETY 'SELECTED IN SICILY AND GROWN ecotypes: Nuciddara

Organoleptic and sensory characteristics: The extra virgin olive oil produced is characterized by its intense fruity smell of olive oil, accompanied by the typical notes of artichoke and sometimes green tomato and green almond, accompanied by rare thistle hints and leaf tomato, with a predominance of bitter and spicy.

Product specification of Extra virgin Olive Oil PDO: Extra virgin olive oil PDO "Valle del Belice", extra virgin olive oil PDO "Val di Mazara"

Use in local food production: The oil is typically used raw to dress red meat, white fish and soups.

Description:Cultivar renowned for the production of table olives, Nocellara del Belice has its name in the shape of the fruit (spherical) and in the origin of the valley: Belice Valley. The medium to low vines have a tendency to thicken and expand. Flowers are sterile cars; Good pollinators are Biancolilla, Giarraffa and Messina's Ogliarola. Irrigated and pruned annually, the cultivar manifests a low production alternation. When the olives are produced for oil production, Nocellara is harvested 2-3 weeks after Biancolilla and Cerasuola. The cultivar is more susceptible than others to drought, the aspect related to the hairy frondosity and the high thickness of the mesocarp, which requires large amounts of water to maintain turgid cells. The large, spherical, medium (7g) fruit has a high pulp / core ratio with an oil yield ranging between 12 and 18%.

5.3.5.NOCELLARA ETNEA



Geographical and Historical Information: Nocellara Etnea is one of the most representative cultivars of central-eastern Sicily, in particular, it is widespread on the slopes of Etna and in the Ragusa area, where it is grown both for direct consumption and for the production of extra virgin olive oil.

Cultivation and native range: A native of Etna and the municipalities of Paternò, Adrano and Biancavilla, it is rife with rates of over 70% in the Syracuse (Avola, Sortino and Melilli) and in the Ragusa area where it is often referred to as "Verdese".

VARIETY 'SELECTED IN SICILY AND GROWN ecotypes: Nuciddara, Verdese, Parturnisa, Marmorina

Organoleptic and sensory characteristics: The extra virgin olive oil produced in the nose is characterized by a medium-intense fruity olive oil, accompanied by the typical notes of thistle or artichoke and sometimes green tomato, herb-leaf and green almond, with a predominance of spicy.

Product specification of Extra virgin Olive Oil PDO: Extra virgin olive oil PDO "Monte Etna", extra virgin olive oil PDO "Monti Iblei".

Use in local food production: The oil is typically used raw to flavor red meat, white fish and soup

Description: Diffusely represented in the olive groves of Central-Eastern Sicily, the cultivar reaches the highest concentration in the territory of the province of Catania.

In the province of Ragusa, the cultivar is also known by the dialectical term "Virdisi", with which the avi acknowledged, to this local ecotype, the characteristic of the olive tree to maintain for a long time the green coloration. Comparative studies, with the adjacent production area of the Nocellara Etna variety, have shown remarkable similarities between the two ecotypes, to induce some scholars to say that it is of the same variety. This variety in the province of Ragusa is cultivated predominantly in the municipalities of Ispica, Pozzallo and Modica.



The fruit of ellipsoidal shape can reach a length of 5 cm, a diameter of 2.5 cm and a weight of about 10 g; Has a high pulp / core ratio; The kernel, smooth, easily and completely separates from the flesh

that is crisp. For the complexity of these characteristics, the fruits of the Nocellara etnea, tanned in green, are destined for direct consumption.

The autochthonous cultivar produces abundantly in the selection areas where, in addition to smaller cultivar plants, Moresca and Tonda Iblea are well represented. Maturation is rather late; The oil yield is medium to low (13-15%) and the oil is characterized by medium intensity fruity, with the prevalence of the smell of love on the spicy and a mixture of very tasty aromas of artichokes, green tomatoes and almonds . The color of the oil is matte emerald green, which, with the presence of phenolic substances, remains in this state for a long time. The cultivar is a varietal base of the DOP Mount Etna.



5.3.6. OGLIAROLA MESSINESE



Geographical and Historical Information: Ogliarola Messinese is one of the most widely grown cultivars, even if it appears to be mainly grown in the coastal strip of the provinces of Palermo and Messina. In addition to the production of oil, the cultivar is known for the production of the particularity of dried olives.

Cultivation and native range: The cultivar is a native of the Ionian coast of Messina, and is widespread throughout Sicily, and in particular also in the Tyrrhenian Messina (Capo d'Orlando, Santagatese) and in the province of Palermo (Termini Imerese and Cefalu).

VARIETY 'SELECTED IN SICILY AND GROWN ecotypes: Passulunara, Castriciana, Calamignara

Organoleptic and sensory characteristics: The extra virgin olive oil produced is characterized by its intense fruity smell of the medium oil, accompanied by a hint of artichoke, tomato or herb and bitter almonds, with a predominance of spicy.

Product specification of Extra virgin Olive Oil PDO: Extra virgin olive oil DOP "Valle del Belice", extra virgin olive oil DOP "Monte Etna", extra virgin olive oil DOP "Valdemone", extra virgin olive oil DOP "Val di Mazara".

Use in local food production: The oil is typically used raw to flavor red meat, white fish and soups.

Description:It is the most popular and representative variety of Sicilian olive cultivation. The cultivar is found both in the olive groves near the sea and in the marginal olive groves. The tree, of medium vigor, has expanded tendency with younger branches tendentially pendulum. The autochthonous cultivar produces regularly in the presence of plants of Biancolilla, Giaraffa and Santagatese. Fruits, medium to large, with a high pulp / kernel ratio (6-7), in addition to being used for oil production, are intended for direct consumption as canteen olives. Oil yields are around 15-20%. The oil is characterized by high oleic acid content (about 78%) and polyphenols (over 250 ppm).



5.4.LOCAL OLIVE VARITIES

TURKEY

5.4. Local Olive Varieties, Turkey

5.4.1. Introduction

Olive is one of the most ancient fruit tree species in the Near East and the Mediterranean. It is hypothesized that at least two Mediterranean refugial zones existed during the last glaciations (30 000-10 000 BP), the east one comprising Israel, Syria and Turkey. Olive, accepted as a sacred tree in the Near East, and all holy books, the Old and New Testaments and Quran has excerpts on olives. It was the common symbol used around the Mediterranean Basin throughout all civilizations, Egyptians, Phoenicians, Greek, Etruscan, Roman and Arab (Rugini et al., 2011). Anatolia being on the cross roads of civilizations is the home for olives since its early domestication. As in many other locations, farmers selected best olive types satisfying demands of the communities among the existing population and then vegetatively multiplied. Even if there are different views on distribution of olive through the Mediterranean Basin, evidences show that the effect came to Anatolia from the east. Owen et al. (2005) evaluated 65 economically important accessions in eastern Mediterranean Basin and found that Turkish genotypes closely relate to those originating from Syria and Lebanon. A genetically distant second group was formed by Greek and western Mediterranean olive genotypes. Only one Turkish variety was synonymous to a Greek olive variety.

In western Turkey, excavations in Urla township of Izmir revealed olive cultivation dating to fourth and third millennia BC. The olive mill functioned 2600 years ago is the oldest olive mill known to have operated in Anatolia. This mill has storage facilities and two wells, similar to the technology used today. Ionians living in the city of Klazomenai (Clazomenae) constructed the olive mill (Koparal and Iplikci, 2001).

A Late Bronze Age boat sunk near Uluburun (Kaş, Antalya) possessed various fruit remains including olives. Hittite tablets (ca 200-1300 BC) found in Anatolia mention 'gis agis Oil Tree' being cultivated in southern Cilicia (eastern Mediterranean) Region (Ünsal, 2003).

When Turkish groups settled in Anatolia from Central Asia around 1000 AD, they inherited the already existing olive and olive oil culture. Olive, vegetables and mezes cooked or prepared with olive oil were a part of the royal cuisine during the Ottoman period as well as those of poor mainly around coastal areas. After the foundation of the Turkish Republic, the agricultural policy supported and enhanced olive and olive oil production. A second movement occurred as transition from traditional to modern olive and olive oil production during the mid-1990s. During the last decades, there is a significant increase in the number of olive trees and upgrading of the olive oil mills.

Turkey is situated between Asia and Europe, Anatolia the biggest part is in Asia, and Thrace is in Europe. Turkey lies between 36°-42° south-north latitudes and 26°-45° west-east longitudes. Olive grows mainly around the coastline and in the southeastern Anatolia region. In terms of the olive tree population, the western Aegean Region ranks at the top, followed by the Mediterranean (southern Turkey) and the Marmara Regions. The Olive Research Institute of the Ministry of Food, Agriculture and Livestock (<http://arastirma.tarim.gov.tr/izmirzae>) hosts the national olive gene bank in Bornova-İzmir. There are many molecular studies on Turkish olive genotypes estimating the genetic variation particularly to overcome high occurrence of mislabeling, synonyms and homonyms among olive germplasm. Kaya et al. (2013) analyzed the genotypes present in the national gene bank, assessed genetic relatedness and found a wide variation and few synonyms. Some of the studies targeted locally adapted genotypes whereas some others analyzed a high number of well-known genotypes. In a study

of 66 Turkish olive varieties, the results showed greater genetic differences between Southeast Anatolian and Marmara varieties than those from the Aegean, Mediterranean, and Black Sea regions (Işık et al., 2011). The olive varieties are locally adapted to the regions. During the last two decades, Gemlik variety originating from Marmara Region is widespread in all regions. This part on Turkish local olive varieties introduce major properties as synonyms, tree and fruit growth characteristics and uses at regional level. The names of minor local varieties are only given. Some of the local names are given based on the specific feature of the variety as in the following examples: ‘Yağlık’ means for oil extraction, ‘Yuvarlak’ means round, ‘Erkençe’ means early, ‘Çilli’ stands for fruit with specks (lenticels), and ‘Salamuralık’ refers to table processing. Most of the varieties are locally utilized for table consumption as well as for oil extraction.

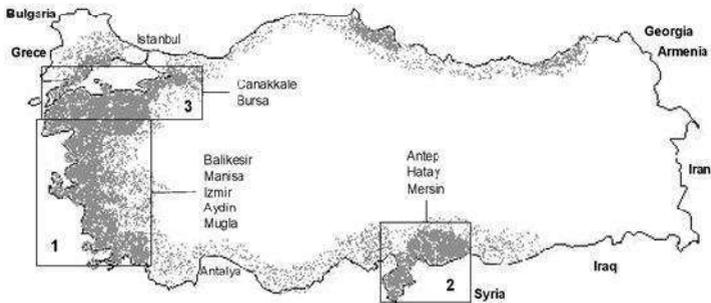


Figure 1. Main olive producing regions and provinces in Turkey (Can and Isfendiyoğlu, 2006)

1: Aegean; 2: Mediterranean; 3: Marmara; and 4: Black Sea Regions.

5.4.2.Olive Oil Varieties in Regions

5.4.2.1.AEGEAN REGION

Aegean Region with 63 million trees comprise 67.7 % of the Turkish olive tree population. Olive fruit are utilized for oil extraction and green and/or black processing for table consumption. In northern Aegean coast (Balıkesir province), 'Ayvalık' is the pre-dominant variety, whereas in the southern part (İzmir, Aydın and Muğla provinces) it is the 'Memecik'. Other varieties of secondary importance are Ak zeytin, Aşı yeli, Çakır Çilli, Dilmit, Erkence, Eşek zeytini (Ödemiş township), Girit zeytini, Hurma kaba, Hurma karaca, İzmir sofralık, Karayaprak, Kiraz, Memeli, Taş arası, Tavşan yüreği, Yağ zeytini, and Yerli yağlık. Most of the old olive groves are established with many varieties.

AYVALIK



Synonyms: Edremit Yağlık, Midilli, and Şakran. Found to be synonym of the Greek olive variety Mitilini (Owen et al., 2005).

Distribution: It is the major variety of the north-western Aegean Region and makes up 25 % of total olive trees of the Region.

Tree growth, pollination requirement and fruit characteristics: Trees have a medium vigor and erect growth habit under favorable conditions. Fruit is medium-sized (247 per kg.) and nearly spherical, dark wine colored at ripening. Oil content is 24.7 %. Ayvalık trees display moderate alternate bearing. Drought tolerance of the trees is low, and cold resistance is moderate. Partially self-fertile, pollinators are: Gemlik, Memecik and Erkence varieties.

Uses and olive oil quality: Fruits are suitable for oil production and green pickling for table olive consumption. The oil is oil quality. Processed also as pink or black table olives.

Geographic Indications: Present for Turkey as olive oil and green table olives.

'Ayvalık' olive oil has protected designation of origin in Turkey.

'Edremit Körfez Olive Oil' and 'Edremit green cut olives' for table consumption have received protected designation.





MEMECİK

Synonyms: Taş arası, Aşı yeli, Tekir, Gülümbe, Şehir yağlık.

Distribution: Origin is from Muğla province in southwestern Turkey. More than 50 % of olive trees in the Aegean region belong to this cultivar.

Tree growth, pollination requirements and fruit characteristics: Has a large canopy and strong lateral branching with a drooping habit. Fruit is large (209 per kg) and ovoid, pit is large, fruit color deep wine-black at ripening. Oil content is 24.5-28.6 %. Tendency to alternate bearing is severe. Partially self-fertile and pollinator varieties are: Ayvalık, Gemlik and Memeli.

Uses and olive oil quality: It can be harvested early for green table consumption or later for processing as black table olive or for oil extraction. Its total phenolic and antioxidant contents are relatively high and thus Memecik oil has a stronger flavor. The oil color is dark greenish yellow.

Geographic indication: There are two protected designation of origin based on Memecik variety, 'Milas Olive Oil' and 'South Aegean Olive Oil'.



DOMAT

Synonym: Akhisar

Distribution: Widespread in Akhisar, Turgutlu, and Saruhanlı townships of Manisa; Kemalpaşa, Bornova, and Selçuk of İzmir and Söke and Karacasu townships of Aydın provinces in western Turkey.



Tree growth, pollination requirement and fruit characteristics: Trees are vigorous with a spreading habit. Early bearing and low tendency for alternate bearing. Cannot be propagated easily by cuttings, so mainly grafted. Partially self-fertile. Pollinating varieties are: Ayvalık, Gemlik, Memecik and Memeli. Fruits are large (189 per kg), and elongated, pits are medium sized and easily separated from flesh. The oil content is ca 20.6 %.

Uses: Major olive variety for green pickling. Fruits are harvested at green stage, pits are removed and stuffed with pepper, almond kernels or carrot and marketed as 'stuffed olives'.

ERKENCE

Synonyms: İzmir yağlık, Yerli yağlık, hurma

Distribution: Origin is Karaburun peninsula and currently grown in Karaburun, Çeşme, Urla and Foça townships in Izmir province.



Tree growth, pollination requirement and fruit characteristics: Very vigorous under good care. Fruit is medium-sized (329 per kg.) and ovoid. Time of ripening is the earliest in the Aegean region, deep wine-black at ripening. Oil content is 25.5 %. Tendency to alternate bearing is severe. Depending upon site-specific conditions some fruit lose bitterness and ripen on the tree, thus edible directly after harvest. Since its color resembles ripe and dried date fruit, it is called 'date' (hurma in Turkish) olives, locally. Partially self-fertile, pollinators are Ayvalık and Çakır olive varieties.

Uses: Harvested black as ready-to-eat for table olive consumption. Suitable for oil production, as well.

ÇEKİŞTE

Synonyms: Kirma, Memeli.

Distribution: Widespread in İzmir (Ödemiş, Kiraz, and Torbalı townships), and Aydın (Nazilli, Sultanhisar and Yenipazar towns).



Tree growth, pollination requirement and fruit characteristics: Trees are vigorous and productive, and can be propagated by grafting and cuttings. Fruits are large and pits are medium sized. Oil content is 26.9%. Partially self-incompatible. Pollinating varieties are Ayyalık, Memecik, Gemlik and Erkence.

Uses: Used as green table olives processed as ‘çekişte’ crushed (hammered to create cracks in the fruit flesh) olives.

USLU



Synonyms: Akhisar,

Distribution: Mainly in Akhisar and Turgutlu townships of Manisa province, Kemalpaşa and Selçuk towns in İzmir and Central and Yatağan townships of Muğla province.

Tree growth, pollination requirements and fruit characteristics: Fruits and pits are medium-sized and oil content is 21.5 %. Fruit are susceptible to low temperatures. Fruit flesh is soft and requires care during harvest and storage. Self-fertile, pollinators are Erkence, Gemlik, Erkence and Ayvalık.

Uses: Utilized mainly in processing for table consumption of black olives due to its appealing and shiny black color and taste.

5.4.2.2.MEDITERRANEAN REGION

Olive prevails throughout the southern coast of Turkey, the Mediterranean region. There is a big competition between olives and other crops since mild climatic conditions favor production of various subtropical species and precociousness. Büyük Topak Ulak, Çelebi (Silifke), Elmacık, Halhalı (Hatay), Karamani, Sarı Habeşi, Sarıulak, Saurani, Sayfi and Küçük Topak Ulak are local varieties however some of the well-known olive varieties originating from the Aegean and Marmara regions are also grown.

BÜYÜK TOPAK ULAK

Synonym: Topak aşı.

Distribution: Grown in Tarsus and Seyhan townships of Adana province, İskenderun town in Hatay, Anamur and Erdemli in İçel and Sütçüler town of Isparta.

Tree growth, pollination requirements and fruit characteristics: Trees are vigorous under good care. Propagated by grafting. Displays alternate bearing, fruits are large, pits are comparatively small, and contain 20.2 % oil. Fruit flesh is soft demanding care at harvest and transportation.

Uses: Fleshy and tasty fruits are utilized as green table olives.

SARIULAK



Synonym: Tarsus.

Distribution: Grown in Center, Erdemli, Gülnar and Tarsus townships of İçel and Seyhan, Kozan and Yumurtalık in Adana provinces.

Tree growth, pollination requirement and fruit characteristics: Tree are vigorous. Fruits are medium sized, pits are large and fruit contain 18.8 % oil. Trees are rather susceptible to cold and cracks occur on the terminal young branches. Fruits may ripen on the tree under cold conditions. Partially self-fertile, pollinators are Eğriburun, Saurani, Çilli, Gemlik, Ayvalık, Memecik.

Uses: Locally for processing as green and black table olives.

5.4.2.3.MARMARA REGION

Olive production plays a crucial role in Gemlik, Mudanya and İznik townships of Bursa providing 90% of the family income. Local varieties are Gemlik (the dominant variety) and Edincik su, Beyaz yağlık, Çelebi (İznik), Çizmelik (Tekirdağ), Erdek yağlık, Eşek zeytini (Tekirdağ), Samanlı, Şam, Karamürsel su, and Siyah salamuralık.

GEMLİK



Synonyms: Trilye, Kıvırcık, Kaplık, Kara.

Distribution: The most important olive variety originating from the Marmara region. Today, it is widespread and grown in Bursa, Tekirdağ, Kocaeli, Kastamonu, İzmir, Manisa, Aydın, İçel, Adana, Antalya and Adıyaman provinces.

Tree growth, pollination requirement and fruit characteristics: Among nursery trees grown in state or private nurseries, 80 % belong to Gemlik variety since it is easily propagated by cuttings. Trees have a medium vigor and spherical canopy. Fruit is medium-sized (268 per kg.) and nearly spherical-cylindrical, bright deep black at ripening. Partially self-fertile, pollinating varieties are: Ayvalik, Samanlı, Çakır, Erkence. Oil content is 29.9 %. Yield is almost constant under good care. Partially resistant to cold. Can be propagated by rooting cuttings.

Uses: Major variety for black olive pickling. Its main use is for black processing, however the larger sized fruit are destined for processing industry and smaller fruits go for oil extraction.

Geographic indication for Gemlik olives processed at black stage for table consumption.

SAMANLI

Synonym: Tatlı. The synonym 'tatlı' means sweet or dessert in Turkish due to its low bitterness compared to other varieties.

Distribution: Grown mainly in Karamürsel and İznik.

Tree growth, pollination requirement and fruit characteristics: Fruit and pit sizes are medium, and fruit contains 20.8 % oil.

Uses: Locally consumed as green table olives.

ÇELEBİ

Synonym: İznik Çelebi

Distribution: Widespread in İznik, Orhangazi, and Gemlik townships of Bursa and Gölcük province of Kocaeli.

Tree growth, pollination requirement and fruit characteristics: Trees are medium sized, crown is small but shows spreading habit, Fruits

are large and cylindrical in shape, productivity is medium and displays moderate alternate bearing, fruits contain 21 % of oil.

Uses: Mainly for processing at green stage for table consumption.

EDİNCİK SU



Synonym: Erdek su, Su zeytini.

Distribution: Edincik, Bandırma and Erdek townships of Balıkesir Province.

Tree growth, pollination requirement and fruit characteristics: Trees are medium sized, fruits are large and very susceptible to mechanical injury at harvest, medium productivity, and show alternate bearing, can be propagated by rooting cuttings and by grafting. The fruit water content is high and oil content relatively low. Fruit are highly susceptible to pest damage. Self-fertile, olives varieties as Erkence, Uslu, Memecik and Gemlik can be used as pollinators.

Uses: For black processing.

5.4.2.4.SOUTHEAST ANATOLIA REGION

Main varieties in the region are Kilis Yađlık, Nizip Yađlık, Halhalı (Derik), Eđriburun (Nizip), Kan and elebi. The region is rich in genetic resources and the following varieties are also present: Belluti, Eđriburun (Tatayn), Halhalı, elebi, Hamza elebi, Hırhalı elebi, Hursuki, İri Yuvarlak, Kalem bezi, Mavi, Melkabazı, Tespih elebi, Yađ elebi, Yađlık elebi, Yađlık Sarı Zeytin, Yuvarlak elebi, Yuvarlak Halhalı, and Yün elebi Zoncuk.

KİLİS YAĐLIK



Synonyms: Kilis

Distribution: This variety originated from Kilis province, and it is the major olive variety in southeast Turkey. The variety is widespread in Kilis, Gaziantep, řanlıurfa, Kahramanmarař and Mardin provinces comprising 52 % of the olive population in South-east Anatolia.

Tree growth, pollination requirement and fruit characteristics: It has a medium vigor and spreading-drooping habit. Shows severe alternating bearing. Fruits are very small- sized (566 per kg) and spherical, bright dark black at ripening. Pits are comparatively large. Fruits have high oil content (27-35 %) and high quality. High yielding however very small fruits are formed in clusters therefore, harvest is rather difficult. Self-infertile. Pollinating varieties are: Ayvalık, Girit, Nizip Yağlık, Edincik Su, and Memecik. Shot berry formation rate is high.

Uses: Suitable for oil production with high organoleptic characteristics.

NİZİP YAĞLIK



Synonym: Nizip

Distribution: Major variety in Gaziantep (Nizip), Kahramanmaraş (Center), and Mardin (Cizre) provinces. It is the second widespread variety after Kilis Yağlık and comprises 38 % of olives in southeastern Turkey.

Tree growth, pollination requirement and fruit characteristics Trees are high yielding but shows severe alternate bearing. They are tolerant to heat and drought. Fruits are high in oil content (25-33 %) and small sized. The number of fruit per kg is 530. It is partially self in-fertile. Pollinators are Kilis Yağlık and Memecik varieties.

Uses: It is used for oil extraction and black processing. Nizip Olive Oil has protected designation of origin. It is a late ripening cultivar and may ripen on the tree.

Geographic indication: 'Nizip Olive Oil'

HALHALI



Synonym: Derik

Distribution: It is one of the significant olive varieties in the southeast region. Trees are found in Mardin, Hatay, Gaziantep and Kahramanmaraş provinces.

Tree growth, pollination requirement and fruit characteristics: Trees show medium vigor, productivity is also medium, can be propagated by cuttings or grafting, shows severe alternance, fruits are medium sized, and the pits are big. Oil content is reported as 21.9 %.

Uses: Fruits harvested at green stage are used to process 'çekişte' crushed type olives for table consumption.

5.4.2.5.BLACK SEA REGION

Olive grows mainly in protected microclimates in Artvin, Trabzon, Samsun and Sinop provinces. Fruits are processed and consumed locally. Varieties present in Black Sea Region are Butko, Görvele, Marantelli, Patos, Otur, Sati, Samsun Salamuralık, Samsun Tuzlamalık, Samsun Kırmızı Tuzlamalık, Samsun Yağlık, Sinop and Trabzon Yağlık.

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ECOLIVE

6. AWARENESS RAISING



6.1.AWARENESS RAISING

6.1.1.HEALTH IMPLICATIONS OF ORGANIC MANAGEMENT SYSTEMS

The recent history of agriculture reveals high input use parallel to the agro industrial developments. High yielding improved varieties resulting in vast monocultures provided cheap food through elevated mechanization and herbicide use, which triggered the global trade. However, monocultures became a part of a vicious circle by providing continuous food for pests and diseases, resulting in heavy use of pesticides, development of resistance, negative impact on environment, increased food safety problems and development of novel pesticides and transgenic varieties to overcome these problems. Organic agriculture started as a bottom-up approach by pioneers at the beginning of the 20th century in the western world that led the intensive production systems. During the last decades, consumers' trust in food quality and safety decreased as they became distant to the producer and as food scandals appeared. Companies or non-governmental organizations created set of parameters and inspection systems leading to certified products to regain trust. The governments developed legislative framework for such systems and apply stricter measures in agro-food trade. Today, the information available, whether true or not, on safety or quality disseminates very rapidly throughout the world bewildering the consumer. Thus reliable sources are required for a clear picture.

Organic management system is developed not as a solution to high food quality or safety, but built upon three pillars to address ecological, economic and ethical issues present in agro-food system. Therefore, if one has to seek benefits provided by organic management, then he/she has to consider these aspects as a whole. Additionally, the prevailing

challenges are interrelated and could be more or less case specific. The overall sustainability or specific parameters may differ in case of transition from an input-intensive system or from a low-input system to organic management. Organic aims to build shorter marketing channels or regular organic buyers prefer to buy more local food, which exert an indirect effect on greenhouse gas emissions. Similarly, this attitude may help to promote local rural development. Survey undertaken in many countries reveal that the major impulse for buying organic goods may vary from a society to the other however intention to buy more healthy products still remain as the major driving force. Environmental sustainability, biodiversity preservation, animal welfare or ban on genetically modified organisms are the other factors that affect consumption of organic food.

Consumers are becoming increasingly aware of what they eat and how food was produced or processed. Many research works present the health benefits of various food due to their phytochemical composition. Some may contain just one or two known antioxidants whereas others may have a combination of various groups of antioxidants. Therefore, for a consumer it is not possible to point out one compositional character in the food and promote its consumption by linking it with health and well-being. There is always a recommended dietary allowance (RDA) and excess or inadequate intakes may result in health problems. Today, the focus is on the overall diet as in the case of the Mediterranean diet accompanied by the life style. Olive oil is the main element of the Mediterranean diet together with vegetables. National and international legislation and standards aim at guaranteeing consumer health, however the limits allowed may vary from one country to another or in case the country is producing the commodity or importing. In case of contaminants like pesticides, growth hormones, heavy metals or mycotoxins, some may arise from mismanagement or from drift as for the pesticides whereas others may appear naturally e.g. mycotoxins.

Organic is accepted as a management system of the ecosystem where ecological cycles are regenerated to maintain soil and ecosystem health and fair opportunities for all living organisms. In this regard, standards or regulations consider scientific results with a precautionary approach in allowing the use of inputs and/or methods for production and processing. Even if it may vary from one standard to the other, the general approach that have positive implications for human and animal health in organic system depends on:

- (1) Evaluation of inputs and methods to maintain environment and product safety;
- (2) Analysis of the production site for any risk of environmental pollution prior to conversion;
- (3) Inspection of the whole production chain against valid standards and
- (4) In case assessment shows conformity to the reference standard issuing of the organic certificate. The organic certificate allows the consumer, even if distant from the producer, to understand how the food was produced thus help to build trust.

During the last decades, various research work or meta analyses are performed on quality and health properties of organic food and compared them with conventional ones. To make a true comparison all the production factors as the soil texture and composition, site specific factors (altitude, aspect), plant specific properties (rootstock, variety, age, planting distances, on or off-year), climatic conditions, water quantity and quality, variety, cultural practices (pruning, fertilization), harvest maturity, pest, disease and weed management need to be the same. As an example, buying organic and conventional olive oil from the market and analyzing the quality does not reveal a scientific result in respect to quality and safety of organic. All of the above-mentioned factors effect olive oil quality whether under organic or conventional management systems. Therefore, to identify the real impact, long-term

trials are designed or systematic reviews that assess results of reliable research work are performed.

The focus in evaluating organic food quality and health property compared to the conventional should be considered from different points of view. First question to be answered is:

Does the ban or limiting the use of synthetic inputs, irradiation and GMO affect the product safety or residue levels? Organic pest, disease and weed management rely on biological methods as rotation, resistant varieties, cover crops, traps etc. and in case chemicals are required, then these are evaluated from safety point of view. Copper which is a widely used fungicide is limited in respect to quantity since it may accumulate in the soil or be toxic in case of chronic intake. Organic system aims at maintaining long-term soil fertility instead of feeding the plant with readily soluble synthetic fertilizers. The ban or restriction in synthetic chemicals as pesticides, growth regulators or fertilizers result in very low levels of contaminants. Surveys on organic and conventional food products revealed higher levels of toxic metal cadmium originating from synthetic fertilizers and four-times more likely to contain detectable pesticide residues in conventional (Baranski et al., 2017). In the EU, there are 389 pesticides approved as pesticides and only 35 are approved for organic pest management. Those that are allowed are either of very low toxicity (except pyrethrins and copper) from the consumers' point of view or are permitted only in traps, which do not contact with the product (Axel et al., 2016). Agro-ecological approach especially increased diversification in organic agro-ecosystems also help to reduce the use of pesticides. Organic crops are reported to have less nitrate residues since in organic management nitrogen is supplied through organic material that are less soluble than the synthetic highly soluble nitrogenous fertilizers. On the other hand, organic does not mean that the product is completely free of any contaminants since there could be

contamination from natural sources or drift from the environment. Genetically modified organisms are banned not only as use of transgenic varieties (seeds) but also in all inputs like pest control agents, microorganisms or processing agents should be free of genetic engineering. Similarly, irradiation, many of the food additives and cleaning agents are not allowed in organic persuading consumers who are skeptical about the impact of irradiation or additives. Ban or limitations on inputs prevent environmental pollution, which in return help to have a clean agro-ecosystem that will allow clean cycles of crop production in the future, as well.

The second question is, is there a compositional difference between organically grown crops and conventional ones? The food is composed of thousands of primary (e.g. proteins, carbohydrates, fats) and secondary (e.g. vitamins, phenolic compounds) metabolites. The studies focus either on few compounds or on a specific compound. Organic products generally contain more dry matter, phenolic compounds, vitamins, essential amino acids and sugars (Rembalkowska and Srednicka, 2009). A study performed on olive oil (cv. Koroneiki) evaluated the influence of fruit ripening stage, crop year and management (organic versus non-organic) system on quality. Organic olive oil exhibited higher total phenolic content. Total unsaturated and saturated fatty acids differed according to cultivation method, crop year and maturation. Oleic and palmitoleic acids varied according to cultivation method and according to maturation stage. Overall, olive oil from organic cultivation was of superior quality compared to non-organic. Maturation stage and crop year affected olive oil quality significantly, as well (Anastasopoulos et al., 2011). In Spain, two major olive varieties, Picual and Hojiblanca were harvested at different ripening stages under organic or conventional management. The results showed significant differences in the acidity, oxidative stability, tocopherol contents, fatty acid composition and phenolic content of oils extracted from organic and conventionally grown olives. However, the impact of variety and the maturity stage had

a greater effect on the physico-chemical and nutritional parameters (Jimenez et al., 2014).

Several compositional differences are reported between organic and conventional crops, however the main concern from the consumers' point of view is, are organic products more nutritive or good for health than conventional? Direct impact on health due to ban or restrictions on pesticides, growth regulators (hormones) or food additives is handled under the first question therefore excluded here. Baranski et al. (2017) report that organic crops have higher antioxidant activity; each individual antioxidants being 18 to 69% higher than conventional ones. Vitamins were generally similar or higher in organic crops. Vitamin C was 6 % higher in organic; β -carotene/Vitamin A was similar or higher in organic. A-tocopherol/Vitamin E was found similar or slightly higher in conventional (Mie et al., 2016). Antioxidants that include vitamins and phenolic compounds are known to reduce the risk of non-communicative diseases as heart attack, stroke or cancer.

There are many studies putting forth benefits brought by organic food consumption. However, lifestyle factors as the diet composition, use of medicines, health supplements, physical activity, smoking etc. make the biggest impact in human cohort studies. Above stated information is limited to plant products despite various positive results obtained for organic animal based products as milk and meat. For olive and olive oil production in the Mediterranean basin, most of the orchards are still traditionally managed as low-input. It is very well known that many factors other than the management system exert effects on olive oil quality. In this regard, the management system creates a marked difference in olive oil production mainly at and after harvest and during olive oil extraction stages (Please check the related module for more information). To obtain higher olive oil quality, organic rules hinder long waiting periods after harvest and prevent the temperature increase during processing. Additionally, organic does not allow the production of

refined or pomace olive oils. Organic olive oil is always of extra virgin quality possessing higher nutritive composition

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6.1.3.GLOSSARY

Antioxidant: A molecule that inhibits the oxidation of other molecules. Oxidation is a chemical reaction that can produce free radicals, leading to chain reactions that may damage cells. Antioxidants such as thiols, ascorbic acid (vitamin C) or vitamin E terminate these chain reactions.

Contaminants: Any harmful physical, chemical, biological or radiological substance or matter that is present in food, air or water unintentionally added to food, which may be chemicals from natural sources (e.g. heavy metals), mismanagement (e.g. pesticides, GMO) environmental pollution (e.g. pesticides), or formed during food processing.

Cohort studies: A type of medical research used to investigate the causes of disease, establishing links between risk factors and health outcomes. Cohort studies are usually forward-looking - that is, they are "prospective" studies, or planned in advance and carried out over a future period of time.

Food safety: A scientific discipline describing all operations in production including handling, preparation, and storage of food in ways that prevent foodborne illness.

Mycotoxins: A group of toxic secondary metabolites produced by organisms of the fungus kingdom in suitable substrates under favorable conditions and is capable of causing disease or death in both humans and animals.

Pesticides: Chemical compounds that are used to kill pests, including insects (insecticides), rodents (rodenticides), fungi (fungicides), spider mites (acaricides) or weeds (herbicides).

Phytochemicals: Bioactive chemical compounds produced by plants through primary or secondary metabolism, as antioxidants, considered to be beneficial to human health.

Quality: An essential or distinctive characteristic, property, or attribute that help to satisfy the demand.

Recommended Dietary Allowance (RDA): average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%-98%) healthy people.

Transgenic variety: A variety that contains a gene or genes which have been introduced artificially into the plant's genetic makeup using a set of several biotechnology techniques collectively known as recombinant DNA (rDNA) technology or genetic engineering. Also known as genetically modified organism (GMO)

6.2.THE EU'S COMMON AGRICULTURAL POLICY (CAP) AND THE RURAL DEVELOPMENT PROGRAMMES IN THE PROJECT PARTNER COUNTRIES.

6.2.1.The EU's common agricultural policy (CAP)

The EU has 500 million consumers and they all need a reliable supply of healthy and nutritious food at an affordable price. The economic environment is set to remain uncertain and unpredictable. Moreover, there are many current and future challenges including global competition, economic and financial crises, climate change and volatile costs of inputs such as fuel and fertiliser.



The CAP is about our food:

To meet these challenges the EU has created and implemented the CAP. Its purpose is to set the conditions that will allow farmers to fulfil their multiple functions in society — the first of which is to produce food.

Thanks to the CAP, Europe's citizens enjoy food security. As a society, we can be sure that our farmers produce the food we need.

They provide an impressive variety of abundant, affordable, safe and good quality products. The EU is known throughout the world for its food and culinary traditions. Due to its exceptional agricultural resources the EU could and should play a key role in ensuring food security of the world at large.

The common agricultural policy is about our countryside

Farming is not just about food. It is about rural communities and the people who live in them. It is about our countryside and its precious natural resources.

In all EU Member States, farmers keep the countryside alive and maintain the rural way of life. If there were no farms or farmers, our hamlets, villages and market towns would be profoundly affected — for the worse.

Many jobs in the countryside are linked to farming. Farmers need machinery, buildings, fuel. Many people have jobs in these ‘upstream’ sectors. Other people are busy in ‘downstream’ operations — such as preparing, processing and packaging food. Still others are involved in food storage, transport and retailing.

In order to ensure that farmers can operate efficiently and that these upstream and downstream sectors remain modern and productive, they need ready access to the latest information on agricultural issues, farming methods and market developments.

This is why the CAP is improving access to high-speed technologies in rural areas and, by so doing, is contributing to one of the Commission’s top 10 priorities — a connected digital single market. During the period 2014-2020 the policy is expected to provide improved internet services and infrastructure to 18 million rural citizens — the equivalent of 6.4 % of the EU’s rural population.



All in all, farming and food production are essential elements of our economy and society. With its 28 Member States, the EU has around 11 million farms and 22 million people working regularly in farming. The farming and food sectors together provide nearly 44 million jobs in the EU.

Why is agriculture policy set at the European level?

Agriculture is a sector that is supported almost exclusively at the European level, unlike most other sectors of the economy for which the responsibility lies with national governments. It is important to have a public policy for a sector that is responsible for ensuring our food security and that plays a key role in the use of natural resources and the economic development of rural areas.

The main aims of the CAP are to improve agricultural productivity, so that consumers have a stable supply of affordable food, and to ensure that EU farmers can make a reasonable living.

All the Member States share these two objectives, neither of which can be attained without providing financial support to farming and rural

areas. A collective EU policy makes for better use of budgetary resources than would the coexistence of 28 national policies.

There is one big European market for agricultural products, in which a common approach towards supporting agriculture ensures fair conditions for farmers competing in the internal European market and globally.

There can be no doubt that without a common policy, each EU Member State would proceed with national policies with variable scope and with different degrees of public intervention. A policy set at the European level ensures common rules in a single market, addresses market volatility where needed, safeguards the progress made in recent reforms towards increased competitiveness of European agriculture and provides for a common trade policy allowing the EU to negotiate as one, vis-à-vis our global trading partners.



How the common agricultural policy works

Agriculture is more dependent on the weather and the climate than many other sectors. Furthermore, in agriculture there is an inevitable time gap between consumer demand and farmers being able to supply: growing more wheat or producing more milk inevitably takes time. Our consumption of food is largely constant compared with other products, so small changes in the amounts produced can have big effects on prices.

These business uncertainties justify the important role that the public sector plays in ensuring income stability for farmers. Farmers are at the heart of a stable and safe food supply for more than 500 million citizens. The common agricultural policy therefore supports farmers in the following ways:

- **Income support.** Direct payments provide support to farm income and remunerate farmers for delivering public goods not normally paid for by the markets, such as taking care of the countryside.
- **Market measures.** The European Commission can take measures to deal with difficult market situations such as a sudden drop in demand due to a health scare, or a fall in prices as a result of a temporary oversupply on the market.
- **Rural development measures.** National (sometimes regional) programmes of development are established to address the specific needs and challenges facing rural areas. Whilst Member States compose their programmes from the same list of measures, they have the flexibility to address the issues of most concern within their respective territory reflecting their specific economic, natural and structural conditions. As an integral part of rural development programmes, the 'Leader approach' encourages local people to address local issues.

Market measures and income support are solely funded by the EU budget, whilst rural development measures are based on multiannual programming, co-financed by Member States.

A policy financed by the EU budget

The budget dedicated to the CAP is considered by some people to be a controversial issue. For instance, the statement ‘half the EU budget is dedicated to the CAP’ is frequently voiced. Such a statement does not take proper consideration of the EU budgetary mechanism or the objectives of the CAP.

It is true that the policy requires about 40 % of the EU budget. This arises because the common agricultural policy is one of the few areas where one common policy is financed mainly by the EU. In contrast, most other public policies are financed principally by the Member States.

It is therefore important to place the budget of the CAP within the context of all public expenditure within the EU. When seen in this context, the budget of the policy is small — it constitutes only 1 % of all public expenditure in the EU.

In 2016, this was about €61 billion.

Finally, as a share of the EU budget, the budget of the common agricultural policy has decreased very sharply over the past 30 years, from almost 75 % to less than 40 %.

During this period 18 new Member States have joined the Union (more than doubling the number of farmers) and as a result the spending per farmer is much lower today than in the past.

The common agricultural policy is about our farmers

There are about 11 million farms in the European Union and 44 million people are employed in the entire EU food supply chain. Farmers are the first link in this food production chain. They are thus very important strategic and economic players and the EU cannot afford to lose them. Fundamental, instinctive farming skills are not learned from a book, but are passed down from one generation to the next.

However, many young people no longer see farming as an attractive profession, with the result that the number of farmers is decreasing. In

2013, only 6 % of farms were managed by farmers under 35, while 31 % were managed by people over 65.

This is why the CAP helps young people to get started in farming with funds to buy land, machinery and equipment. It also provides grants to train both new and established farmers in the latest technical production methods.

Encouraging young farmers and ensuring continuity from one generation to the next is a real challenge for rural development in the EU.

In some parts of Europe, farming is particularly difficult — as in hilly, mountainous and/or remote areas. It is important to keep communities alive in these regions.

The CAP provides funds to ensure that rural communities in vulnerable areas remain in good economic health and do not gradually disappear.



Thanks to the CAP, farmers produce what consumers want

EU citizens are the ultimate beneficiaries of the CAP. There is always plenty of food in our shops and supermarkets at prices that are generally affordable. In most EU countries today, the average family spends 11 % of its total consumption expenditure on food. This is half of what it was in 1962.

We enjoy a secure supply of high-quality food from our farmers. Europe is considered as a world leader in sectors like olive oil, dairy products, meats, wines and spirits. Furthermore, we can easily find out how and where our food was produced because the EU's labelling and traceability rules give consumers the information they need to make an informed choice when buying their food.

Many EU consumers prefer local or regional products where these are available. Traditional specialities have become increasingly popular and as a result, many farmers now sell their products directly to consumers at farmers' markets and process their own products to add local value. The EU supports these trends by offering protection for over 3 400 products by registering them as 'geographical indications'. These identify a product as originating in the territory of a particular country, region or locality where its quality, reputation or other characteristic is linked to its geographical origin.

Farmers act as managers of the countryside

Around half the EU's land is farmed. This makes farming very important indeed for our natural environment. Farming has contributed over the centuries to creating and maintaining a variety of valuable semi-natural habitats. Today, these shape the many landscapes throughout the EU and are home to a rich variety of wildlife. Farming and nature influence each other. Thanks to the successive reforms of the

CAP, our farming methods are becoming more environmentally friendly.

Today's farmers therefore have two roles — producing our food and managing the countryside. In the second of these they provide public goods. The whole of society — present and future — benefits from a countryside that is carefully managed and well looked after. It is only fair that farmers are rewarded by the CAP for providing us with this valuable public good.

Following the 2013 reform, in order to receive their full entitlement of income support payments, farmers have to adopt environmentally sustainable farming methods.

In practice this means that they must maintain permanent grassland areas (grass is good at absorbing carbon dioxide, which helps in the fight against climate change); they must grow a minimum number of crops and must farm 5 % of their arable area in a manner that promotes biodiversity (known as an ecological focus area). Farmers may also receive additional support if they adopt more strict agri-environmental farming practices.

In addition, the CAP promotes agricultural practices such as safeguarding the scenic value of the landscape — in line with what the public wants.

The rural economy and way of life depend on farming

Although farming is the principal economic activity in most rural areas, farmers do more than grow food. They often process their products and sell them directly to consumers. Indeed, the 2013 reform promotes the direct sale of food products — for instance via farmers' markets.

About half of the EU's population lives in rural areas. Without farming there would be little to keep many communities alive and hold them together. If farming were to disappear, there would be a problem of land abandonment in many areas.

This is why the CAP gives farmers financial assistance to ensure that they continue working the land and to create additional jobs through the renovation of their villages, landscape preservation or cultural heritage

projects and many other tasks directly or indirectly associated with farming and the rural economy.

This helps prevent rural depopulation in the face of few job opportunities and high unemployment. Public services — such as schools and healthcare amenities— are preserved and improved, giving people a good reason to remain in the countryside and bring up their children there.

The dynamism of small family farms will have to be reinforced. Many farmers are over the age of 55 and will retire from active farming at some point in the future. The EU recognizes that the age structure of farmers has become a matter of concern. Helping young farmers get started is a policy ‘must’ if Europe’s rural areas are successfully to meet the many challenges that face them.

The CAP drives competitiveness and innovation

The CAP helps farmers to be more productive and to improve their technical skills.

In its early years, the CAP encouraged farmers to use modern machinery and new techniques, including chemical fertilizers and plant protection products. These were necessary because the priority at that time was to grow more food for the population.

The policy was effective. Productivity increased. Crop yields rose, but have been stable since 2000. In the years to come, research and innovation will be crucial for farmers to produce more from less.

In the face of the food surpluses which resulted, the emphasis has changed. Now the CAP helps farmers to:

- farm in a manner that reduces emissions of greenhouse gases;
- use eco-friendly farming techniques;

- meet public health, environmental and animal welfare standards;
- produce and market the food specialties of their region;
- make more productive use of forests and woodland;
- develop new uses for farm products in sectors such as cosmetics, medicine and handicrafts.

EU research funds are devoted to developing new farming systems so that farmers can respond to the many challenges that lie ahead — not least those of a changing climate and growing pressure on natural resources. In the future, our farmers will have to produce more with less. This could be achieved through the development of instruments, such as innovation partnerships, to promote innovation in agriculture by bridging the existing gap between research and farming practice and facilitating communication and cooperation among stakeholders (farmers, advisers, agro-business, scientists, administrations and others).

Europe's agriculture towards 2020: meeting the challenges ahead

The common agricultural policy delivers food to our tables, providing wholesome, high-quality and safe products at an affordable and fair price.

The CAP has evolved over the years to meet changing economic circumstances and citizens' requirements. The vast majority of citizens support this policy and recognize its substantial benefits. In 2013 the policy was reshaped to meet the challenges of the future. It takes into account the expectations of society and will lead to far-reaching changes: direct support will become fairer and greener, the position of farmers vis-à-vis other players in the food chain will be strengthened and the policy as a whole will become more efficient and more transparent. The CAP represents the EU's strong response to the challenges of food security, climate change and growth and jobs in rural areas. It will continue promoting smart, sustainable and inclusive growth.

As it has done over the last 50 years, the CAP will continue to evolve, bringing benefits to all EU citizens.





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