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Summary

INTRODUCTION

According to guidelines and agricultural good practices to be adopted in order to ensure proper management of the olive-groves, especially in relation to the reality of our country , where the presence of old trees is the key feature , although gradually supplemented by a new olive characterized by a more intensive planting pattern, we will analyze below all operations and those farming operations which can fundamentally affect both the health and the efficiency of production and, more in particular:
1 . pruning

2 . Soil management and fertilization

3. Irrigation

4.Management of adversity

a. Weed management

b . Pest Control

5 . Olive harvesting

6 . Thickening, in replacement of the failed areas .

a. Choice of varieties

b. Choice of the type of farming

1 .Pruning

In the olive groves, the common management practices require the production of pruning, ordinary and extraordinary pruning, and sometimes , as a result of thickening and replacement of some failed areas , including the pruning of breeding.

Pruning of breeding

The adoption of a type of breeding aims to one or more purposes:
- to adapt the relationship between vegetative and reproductive apparatus. An appropriate balance optimizes the production in terms of quality and quantities and at

the same time, provides the nutrients resources necessary to renew the vegetation and fruiting the following year

– To adapt the plant to the lighting conditions : in limited lighting conditions , the form of livestock allows to optimize the utilization of the light favoring the entry in each area of the canopy . In cases where the lighting is excessive compared to the needs of the species , the pruning of breeding has the purpose to prevent damage for example due to excessive solar radiation at the exchange or to the fruits .
– to provide adequate ventilation of the canopy . A too thick hair creates conditions of stagnant air with the formation of a gradient of moisture, evapotranspiration , which hinders the limiting intensity of photosynthesis. In addition, inadequate ventilation encourages attacks by some cryptogams and some insects. The form of farming creates conditions in order that there's an adequate ventilation inside the canopy .
– to facilitate cultural operations : the form of breeding is also designed to facilitate the implementation of certain farming operations, removing the causes that may intralciarle .
– to reduce labor costs : the form of breeding is designed to facilitate the operations carried out manually or with the use of special machines, in particular pruning and harvesting, in order to increase the productivity of labor.

The pruning of breeding applies in the early years of implantation with the aim to give the plant the chosen form and obtain the completion of a robust skeletal structure and the beginning of fruiting in the shortest possible time . For all the forms considered , it is obtained by minimizing the interventions , maintaining initially more lateral branches of those that serve to create the structure of the plants , eliminating only the branches excessively vigorous and / or badly positioned (eg. all suckers ' interior of the canopy) . In order to mechanize the harvesting of olives with vibrators from the trunk, in the case of the vase shape which is the most frequently used , it is necessary to raise the plants in order to obtain a stem free from 1-1.2 m tall vegetation on which they fit 3 - 4 primary branches inserted with an insertion angle of around 35 ° to the vertical and the secondary ones which are bred , kept relatively numerous , short and without abrupt changes in direction.

Finally, it's important to provide the elimination of hanging branches that are poorly responsive to vibrations at the same time, not to reduce the volume of the canopy fruiting, one must allow for a greater growth in height of the trees as if the collection is to be carried by hand or with equipment facilitators , will be necessary to limit the height of 4-5 am and to develop in an expanded foliage. This is achieved by tilting the main branches more than the vertical (up to a maximum of 40 ° -45 °), making stretch a bit 'more of the secondary branches and encouraging the presence of pendaglie.

1.1 Pruning of production

The pruning of production is applied in the adult stage of the plants , has the purpose to maintain the shape given by pruning of breeding, to balance the vegetative and reproductive activities, maintaining in time the production capacity reached and to eliminate any damaged portions of the crown. Fundamental aspect of production pruning and to apply the right intensity .
Often, it implements an excessive pruning that results in a reduction of the production capacity of the plants. Even a slight pruning too much can be harmful , because it can cause excessive shading in the inner parts of the canopy and a high consumption of water, creating favorable conditions for the development of pathogens and pests and the possible onset of water stress. The production pruning should be carried out every year. If this is not possible, should be made at least every two years (two years) and the year in which you do not do the pruning , it would be appropriate to remove the suckers at least in the inner parts of the canopy (that can also be done in the summer) . In the olive groves, where pruning is normally carried out with multi-year round (every 4-6 years), and importantly, in order to maintain a certain balance vegetative-productive and avoid excessive accumulations of vegetation, intervene at least every year to remove suckers .

In the olive grove with a low environmental impact management is of great importance to avoid excessive accumulations of vegetation , as seen, can favor the attack of pathogens (eg peacock eye) and pests (eg, cochineal, which also determines the attack by the sooty mold) , especially in relatively humid environments . In this regard, it must be considered that the different cultivars , may have different vigor , density of vegetation and

susceptibility to parasites. Therefore, it is very important to choose the right intensity of pruning and rotate depending on the environment in which it operates and the nature of the cultivars considered , taking into account the strong effects of this practice on the health of the plants. By pruning you have to remove the diseased parts or attacked by insects in order to reduce the sources of inoculum . However, in plants that have a strong attack of mange , the removal of diseased parts will have to be made gradually to avoid excessive reduction of the leaf surface and in the meantime must be performs treatments using copper to contain the infection . In the case of diseased plants of mange , or worse, to wilt , before moving to prune healthy plants , you need to disinfect tools with solutions based on copper .

1.2 Period of pruning

Pruning should be performed during the entire period of vegetative rest . In areas where there is a risk that you might have cold damage , should be made after the period of heavy frost (in the case of a large part of Puglia the best month to perform the pruning and March), because if it was done before it could make plants more subject to damage from cold. Even the delay of pruning should be avoided , as it causes the weakening of the plants , as well as accompanying materials pruning also runs part of the reserve substances that have since been mobilized from reserve tissues in the direction of hair . Only in the case of very vigorous trees , pruning may be advisable to perform a little bit late (April), because in doing so it causes a decrease of the vegetative to the reproductive advantage of that and it is to promote a better balance between the two activities .

2. **Soil management and fertilization**

As part of an eco-friendly agriculture, fertility management objectives are threefold:
1. improving the fertility of the soil;

2. saving non-renewable resources;

3. renunciation of the use of products which may contaminate I'agroecosistema. The need to achieve these goals derive some good basic rules:

– avoid losses of soluble elements;

– possibly use legumes as a nitrogen source;

– Do not use products obtained by chemical synthesis;

– safeguard the activities of plants and animals that live in the soil;

– fight against erosion.

2.1 Fertility

In an olive eco-friendly, fertility and the biological activity of the soil must be maintained or increased through the development of sustainable agricultural practices, combining different techniques to cover and protect the soil (cover crop, green manure, etc.). through the use of crop residues arising from the farms and animals, with the goal of minimizing the use of resources from outside the company. Such a mode of sustainable management of the crop, you can achieve through the application of different practices listed below:

– the use of green roofs, represented dall'inerbimento permanent or temporary, in which case considerable importance and assumed by the cultivation of green manure, in particular of legumes, which are able to fix nitrogen and then determine a net increase the content of this nutrient in the soil;

– the incorporation of organic matter in soils, preferably composted, from the same company, other companies that practice methods cultivation with low environmental impact from companies that do not apply patterns intensive production / industrial, or acquired on the market;
– the use of fertilizers outside the company both organic and mineral (natural origin) should be assumed only if the systems mentioned above have not been shown effective in ensuring proper nutrition of crop plants;

Based on these assumptions, management can predict the fertility of the olive farming practices below.

2.2 Grassing

The cover crop is the olive tree intercropping with herbaceous species specially sown or , in the vast majority of cases, spontaneous (natural revegetation) . Water erosion is a problem in many of our land . The majority of land in the plan , it must be said , do not suffer from this situation, but passing on slopes the danger grows. Throughout southern Italy and particularly in Puglia rainfall is concentrated during periods when the soil may still be naked and there is also a certain recurrence of rains sometimes very intense . Water erosion , therefore, cause damage undeniable , although difficult to quantify. In some cases it can be felt, albeit in a minor or, at least , the effects were less precise and even macroscopic wind erosion . The only defense in both cases , and maintain a vegetative cover of the land or perform a subsidiary herbaceous winter crop that is sown in autumn and sovesciata or collection in early April , protect the soil . With the grassing the physical properties of the soil are improved by the presence of a dense root hairs that is evenly distributed and more or less deeply depending on the species and also the presence of radical apparatuses taproots promotes deep infiltration water especially in the case of heavy rainfall. This technique presents problems under conditions of limited water availability due to competition for water between trees and sward . In these situations (annual rainfall less than 600 mm) soil management by processing becomes the preferred technique because allows you to make the most of the available water , increasing the water capacity of the soil and therefore the ability to "store " water rainwater and reducing losses due to evaporation and the weeds. Unfortunately, the management of land through the processes , resulting in greater losses of organic matter mineralization , erosion on sloping land and a lower bearing capacity of the soil, especially immediately after the occurrence of rains. A compromise between the two techniques can be represented by the techniques dell'inerbimento dell'inerbimento temporary and partial .

The temporary grassing is to keep the soil covered with herbal essences , letting the

weeds grow or sowing a special herbarium (green manure) , in the autumn and spring (when the majority is concentrated and less rainfall and competition for water) and working the soil in the spring - summer .

The partial grassing , grassing is to carry out the alleyways and working along the rows or in making the cover crop and processing in alternate rows .
In Puglia, the rainfall is not high , it varies depending on the area between 400 and 600 mm / year. In such conditions , it is advisable to perform grassing if you could at least use irrigation to the rescue.

If there is no possibility to make interventions irrigated at least in case of need , grassing grassing temporary or permanent (managed with numerous cuttings to minimize competition for water) may be the right solution to safeguard the organic matter content of the soil. Recent investigations have shown that with the grassing you have water consumption slightly higher but , thanks to the progressive improvement of the physical characteristics of the soil , there is also the formation of a greater water reserve at ground level in the spring , which allows a saving of irrigation water and better management of the plants during the warmest . This indicates that this practice , if well managed , can be used even when the availability of water is not abundant .

In soils that remain naked from autumn to spring, there is a significant loss for leaching of nutrients and nitrogen in particular. The result of what and why you have a doubly negative soil depletion and pollution of groundwater . On the contrary, a ground covered acts in two ways : on the one hand hinders runoff (runoff) water , on the other appropriates the nutrients in plant tissues , momentarily blocking in organic form and making them available later with the decomposition of the tissues plant .

Therefore, the cover crop has several advantages :
– allows you to maintain or increase the level of soil organic matter ;

– favors the presence of beneficial organisms that help in the control of harmful ones ;

– reduces erosion in sloping ground ;

– reduces soil compaction caused by the passage of mechanical equipment ;

– also allows the development of land in the superficial layers of the root of the trees ;
– decreases the loss of nitrogen leaching and , therefore , the risk of pollution of the deep layers of the soil and groundwater ;

– results in better availability of phosphorus and potassium and other nutrients along the soil profile ;

– if it includes legumes , can provide immediately assimilable nitrogen ;

– facilitates the execution of the collection (the most easy movement and handling of the sheets of the machines and reduce the risk of infangatura olives) and pruning.

2.3 Management of grassing

In the first 2-3 years of revegetation may be necessary, in soils with less nutrients, supplementary fertilization to facilitate the settlement of the " lawn " . Subsequently, the contributions arising from the decomposition of mowed material and dead roots , are sufficient for the nutrition of the grass and therefore does not require fertilizer inputs in addition to those required for the olive trees .

The sward should be checked by 2 to 4 mowings per growing season , the first in early spring and the other later when the turf reaches about 20 cm in height. Making the grass grow up to greater heights , it increases the production of organic matter and simultaneously also the competition for water and vice versa. Therefore, if the availability of water are good and you want to increase the organic matter made with the green cover, you can delay the execution of clippings , while in conditions of water availability is not high , you should not delay first mowing . You can reduce the competition for water , working on rotating shifts more short mowing the next , consider also that , in doing so , in the spring-summer period , thanks to mulch mowing creates a layer that allows you to reduce the loss of water to evaporation. In order not to reduce the capacity of regrowth of the grass, the cutting height from the ground must be of 5-6 cm . Every 3-4 years , in the winter , may be appropriate to make a scarifying the lawn to aerate the soil . As an indication, the permanent grass can provide 3-6 t / ha / year of dry matter , equivalent to 0.6 to 1.8 t / ha / year of humus.

2.4 Green manure (green manure)

In the olive groves, to manage the fertility of the soil may be useful to consider the practice of green manuring . When you take into account this possibility , with regard to the water resource, are subject to the same limitations or standards for guidance already given in the case of grassing . The green manure may be total or partial . For green manure total refers to the burial of a herbaceous plant grown specifically , for green manure partial means instead burying residues of cultivated plants to make other types of products. The green manure is very important to make organic matter in situations where the use of manure or compost is not feasible (eg not available in the area / high transport costs) , as it allows organic matter supply dried up to 4-6 t / ha, corresponding to 0.4-1.2 t / ha of humus. In environments in the southern summer and long mild winter , you can enjoy the green manure adopting several herbaceous species autumn - spring (legumes , grasses, cruciferous vegetables , etc.). Sown alone or in mixture . Below are the possible objectives of a green manure and the choice of species .

The main objective Choice of species

Nitrogen fixation	legumes
Assimilation of nitrogen remaining in the soil (catch crops)	Cruciferae, Gramineae
Crumbling and soil aeration	Gramineae, field beans
Rapid land cover	Rape, horseradish, mustard
Water saving	Plowed in autumn - Vernino
Fight against weeds	cruciferous
Offer of flowers for bees in the autumn-winter	Clovers, yellow mustard, field beans
Additional production of forage	Grass-legume mixtures

In general, in the case of green manure, the mixture of different species for the formation of a green cover for burying subsequently is better to use thanks to the effect of a single

species complementary offered by the different plants. Combining legumes with grasses in taproots roots roots collated lead to an improvement of fertility in both chemical and physical structure / permeability / porosity). A well-established practice, especially in semi-arid environments, such as that of Puglia, involves the cultivation of species in autumn-winter from sovesciare in March or April. The average quantity of nutrients and biomass of green manure are made with a function of the chosen species and soil conditions.

Biomass of some herbaceous green manure

Species	Green biomass (q/ha)
Favinos	350-450
Lupine	300-350
Vetch	250-300
Crimson Clover	150-250

The species with autumn-winter most used in Puglia are represented by grasses and legumes ; very common mixtures of barley and field beans or barley and vetch . The cultivation of legumes and sun preferable only if you want to focus on the contribution of the nitrogen thus maximizing the setting of this element through the green manure crop . As a guideline , with green manure legumes can be made available from 50 to 100 kg N / ha, more high quantities are obtained when using only legumes , should be considered , however, that these amounts can vary greatly depending on the environmental conditions and the seasonal . To make it available in a short time most of the nutrients contained in the herbal essences , mowing should be performed at the time of ear emergence in the case of grasses and the beginning of flowering in the case of legumes. Mowing of green manure species may be delayed if, as seen above, you want to maximize the production of stable humus (soil improver effect) , which may have an ameliorative effect on the structure of the soil (and water capacity of the land), but in this case, the fertilizing effect , that the intake of nutrients , it will be slightly reduced.

The use of organic material of vegetable or animal origin

To maintain or improve the fertility of the soil and of great importance to the contribution of organic matter . The organic materials of vegetable or animal origin that can be used for fertilization , are numerous :

 manure of cattle, sheep , goats, horses , etc. . ;

 compost;

 manure ;

 green manure ;

 prunings ;

 residues of the processes of transformation of the olives, which the residue and the waters of vegetation;

 residues from the processing of the bones, wool and hair ;

 scraps of leather .

The organic materials listed , are characterized by a gradual release of nutritive elements , thus allowing to perform their action , as they are required by plants .
The first two materials , are among the organic amendments of vegetable or animal origin , characterized by a low concentration of nutrients and by a high content of organic matter and bacterial flora . The soil at the time of administration to the ground, must be mature , ie the fermentation processes responsible for their formation must be completed for some time and the residual organic component must have additional characteristics of resistance to microbial attack . The compost can have both vegetable origin (soil conditioner Composted Green ACV) that mixed ancestry (mixed composted soil ACM) .

It is important that the organic materials are used, are readily available in the area, especially bearing in mind the cost-benefit ratio of doses.
In order to reduce external inputs , and relevant employ a technique of fertilization that makes best use of the residues of the olive oil sector , as the material of pruning or olive pomace and vegetation water , that remain from the processes of transformation.
For the use of olive residues and wastewater from oil mills (vegetation water), you must

comply with the special rules which determine the limits of acceptability and the method of use. In the latter regard , the maximum doses pomace or vegetation water as such , which can be administered are 50 m3/ha/anno if these materials were obtained with pressure systems (discontinuous) extraction of oil from olives and if m3/ha/anno 80 were obtained with continuous systems of extraction of oil from olives ; these quantities must be verified in the light of current regulations in the different olive-growing regions . The pomace and the vegetable water , can also be mixed with other materials to obtain a compost that, compared to the material as such , has a value greater fertilizer . In this respect, it might be useful composted pomace and vegetation water from olive pruning with the material , with the addition of straw, mowed material , manure and / or manure , etc. . , Perhaps directly in the field to reduce the costs of subsequent transport . For general guidelines on the amount of nutrients resulting from the administration of soil , one can consider that, in general , manure and other soil improvers that can be made in the case of annual distribution , makes available each year about 60 - 70% of the nutrients they contain.

The convenience in the purchase of compost extra-corporate and function of the price , which in turn depends on the type of formulation and / or packaging of the product. For example , some companies sell the compost powdered or pelleted and bags of different sizes or in bulk , with significant differences on the sales price : the powder and / or bulk may have a sale price much lower than pelleted and / or in bags. This must be kept in mind when choosing fertilizers , together with the fact that different types of formulation and packaging , may apply to the transportation and distribution , different equipment . The administration of manure or other organic materials composted or not (eg . Husks) should be performed in autumn / winter after harvest. If the soil is managed by machining and run an operation in the fall , the distribution should be made prior to the intervention. When making green manure , the administration of any organic fertilizers and manure phosphorus -potassium may be made to the sowing of green manure (performed after the first autumn rains) or, alternatively, if well composted , the burial of biomass after mowing .

2.5 Criteria for determining the nutritional needs of the olive

A balanced diet contributes in an important way to build a good relationship between the vegetative and reproductive activity of the plants. The olive tree absorbs from the soil all the nutrients necessary for its development . Fertilization has as its main purpose , to improve or maintain the fertility of the soil , providing for the administration of any nutrient deficient and also using products with low environmental impact (ie those permitted in organic farming) .

To determine the nutrients that need to be made to the olive grove , it is necessary to know the level of fertility of the soil, the nutritional status of the plants and the factors that affect the nutritional requirements of the same (eg, age of the plants, the productive potential of the trees, was health , whether or not under irrigation , etc.). . Useful tools for the determination of the amount of nutrients to be made to the olive grove are represented by the analysis of the soil, the leaf analysis , the calculation of removal and by visual observation of plants.

For proper fertilization and also important to know how to vary during the growing season the absorption of various nutrients . Indicatively , for the main nutrients , we have that :
– nitrogen and absorbed throughout the growing season, with an intensity greater in the period

– that goes from full bloom to hardening of the core ;

– phosphorus and absorbed in the first part of the growing season (the requirements

– this nutrient and generally modest) ;

– potassium, while being absorbed from the beginning of vegetative growth , and used in high quantities in the early stages of growth and inoliazione of drupes .
In determining the nutritional requirements , we must also take into account the status of the olive trees : if weak or emaciated must be made relatively high doses to strengthen them .
For the execution of fertilization and unwise to resort to the so-called recipes fertilization formulated based on the average conditions of climate, soil and crop. More rationally , the

technician or the farmer will decide case by case basis doses of fertilizers to be used considering the amount of nutrients present in the soil (through soil analysis) , the nutritional status of plants (by visual observation and / or leaf analysis) and the level of production that can be achieved as a function of environmental conditions and cultivation of the olive .

The values obtained from the results of the analysis of the soil, should be compared with those of reference for any deficiency in nutrients. To assess the nutritional status of the plants, you can use the technique of leaf analysis that compares the nutrient content of the leaves of the olive considered , with the nutrient content of olive groves taken as a reference and that have a vegetative- state optimal production . The olive groves of reference, should be sites in the surrounding areas and have similar structural characteristics (cultivar , training system , etc. .) To the object of analysis , but unfortunately , these data are often not available , since , in part because of the relatively high costs often the leaf analysis is not used as a practice but only in special cases in order to highlight any deficiencies , excesses or imbalances in nutrients. The best time reference for the implementation of sampling and represented by the winter rest period - from December to January .

Another approach to determine the nutritional needs of the olive and to calculate the quantity of nutrients removed permanently from the ground and not later replenished. The removal of nutrients to be considered for the "calculation of removal," are the following:

– nutrients removed from the parts that are taken away from the olive:

– fruits, leaves and branches after pruning if the latter are taken out from the olive;

– nutrients that serve to support the growth of the parties 'permanent' plants:

– large roots, trunk, branches;

– losses due to leaching;

– fixed in the ground.

Calculation of the amount of nutrients removed

(calculated on 100 plants of medium size)			
Parts of the tree that are deleted: fruits, wood and leaves	**Loss of dry matter (kg / tree)**	**Nutrient content in dry matter (%)**	**Nutrients removed from the soil 100 olive trees (kg)**
Average annual production: 15 kg of olives / tree	8,25	calcium 0,86 phosphorus pentoxide 1,10 Potassium 2,02 Nitrogem 1,18	calcium 7,07 phosphorus pentoxide 9,09 Potassium 16,67 Nitrogem 9,74
Materiale di potatura: kg 20 di legno/albero	11,06	calcium 1,44 phosphorus pentoxide 0,41 Potassium 1,94 Nitrogem 1,01	calcium 16,69 phosphorus pentoxide 4,70 Potassium 22,45 Nitrogem 11,69
Material pruning: 20 kg wood / tree	2,60	calcium 2,54 phosphorus pentoxide 0,43 Potassium 2,73 Nitrogem 1,84	calcium 6,60 phosphorus pentoxide 1,13 Potassium 7,09 Nitrogem 4,79
Parts of the tree that are not deleted: roots, trunk and branches (the amount is comparable to that removed 15 kg of wood)	8,07	calcium 1,44 phosphorus pentoxide 0,41 Potassium 1,94 Nitrogem 1,01	calcium 12,52 phosphorus pentoxide 3,52 Potassium 16,83 Nitrogem 8,77
Removal / Total needs			calcium 41,80, phosphorus pentoxide 18,10, Potassium 61,60, Nitrogem 34,20

According to certain removals in the table, in an olive grove with plants arranged in 6 x 6

mt (278 plants / ha), the requirements of the most important nutrients may be estimated at about 50 kg / ha of phosphorus and 170 kg / ha of potassium and 95 kg / ha of nitrogen. These quantities refer to an olive grove that produces about 41 kg / ha of olives and, therefore, more productive olive groves with potential should be appropriately increased. In the case of ancient olive groves of course you have to consider the number of plants per hectare, probably the most low and the size of the plants, which can be substantial.

2.6 Auxiliary Fertilization

The use of auxiliary fertilizers external to the company , both organic and mineral , should be limited to cases in which the use of green roofs and the use of organic materials of plant or animal origin is not sufficient to ensure proper nutrition to the plants.

The recommended nitrogen fertilizer , are those arising from epithelium animal, blood meal, from hides, skins, wool and horsehair , from cornunghia roasted , dried manure , oil cake from castor , etc. .. In general, these fertilizers , being organic , yield nitrogen more gradually than those minerals normally used in conventional agriculture . However, there are differences, also marked, between the different fertilizers with regard to the speed of transfer of nutrients , for example those derived from blood meal nitrogen yield much more quickly than those made from cornunghia .

These differences must be taken into account in the choice of the period of administration.

Therefore fertilizers derived from blood meal to be administered shortly before vegetative growth of the plants; those obtained by cornunghia instead should be given well in advance of the vegetative growth . Some fertilizers are very expensive (eg, those based on blood meal) and this will have to be kept in mind when making your choice .

Regarding the potassium are also available for organic fertilizers , including stillage , which have an effect rather quickly . When you need to make phosphorus (which is not very common in Apulia) , if you use mineral fertilizers suitable for the fertilization of background , must be taken into account in the choice of the reaction of the soil, soils with a basic pH tend to immobilize phosphorus , however, making it unavailable .

In the market there are numerous organic fertilizer containing all the major nutrients and their percentage content (title) and label.
For the olive, are usually needs more nitrogen and potassium than phosphorus , and therefore should be administered under the fertilizers that have relatively high nitrogen and potassium and low in phosphorus . This may also be achieved by administering different fertilizers that are complementary , for example one that contains more nitrogen and one that contains more potassium.
The manure and fertilizer to be administered alone or useful to integrate the contributions of manure or compost.

2.7 Foliar fertilization and irrigation with auxiliary fertilizer

The foliar and fertigation can not DEEMED practices of ordinary fertilization but may be considered to overcome any temporary crisis nutrients, such as nitrogen, especially during flowering and fruit set, which can occur when you have the temporary immobilisation of 'nitrogen by microorganisms that are decomposing organic matter with high C / N ratio or in the early years of revegetation) or micronutrient deficiencies, using fertilizers that can be solubilized. But these occurrences are infrequent in the case of olive trees.

2.8 Where to distribute fertilizers

When the projection of the trees on the land affects more than 50 % of the area , fertilization should be carried out over the entire surface of the olive . Otherwise best performed by distributing fertilizers and especially at the edge of the

projection of the foliage on the ground, where they are usually localized plant roots younger and more efficient in absorbing nutrients from the soil.

2.9 Fertilization Strategies

In olive groves without revegetation , with productions of 30-40 q / ha , fertilization can be done by burying the remains of pruning and making fine annually 20-30 t / ha of manure or compost with equivalent composition . For olive groves with higher production , you need to increase your intake of manure / compost and / or manure also administer auxiliary . Another possibility is to alternate the contribution of manure / compost and implementation of green manure (of grasses and legumes or pulses sun), integrating these fertilizations , if necessary, by administration of fertilizers auxiliaries.

In olive trees replanted , the need to make fertilization with manure or compost and less important than those manufactured and therefore, if these fertilizers are not available , there is no particular difficulty in meeting the nutritional needs of plants by feeding of fertilizers auxiliaries. In the case of land managed by cover crop or green manure , and should shred the prunings . The shredding pruning residues is performed at the time of green manure or mowing the lawn. This combination , especially with the green manure , is useful in order to compensate for the possible temporary removal of nitrogen , by microorganisms breakers of woody materials (material pruning) . It would be appropriate to make specific fertilizer which will provide readily available nitrogen (20-30 kg / ha of nitrogen) , administration of manure or compost. This gain to maximize the effect , it should be plowed , a practice that if done partially , could coincide with the breaking of the grass made for " aerate the soil ." performed every two years in alternate rows , doubling the annual doses . If you do not have to perform the breaking of the lawn, and / or if the terrain and at high risk of erosion , manure / compost can be left on the surface.

In all cases , if the manure or compost are not sufficient to meet the nutritional

needs of trees , can switch between the administration of these fertilizers to fertilizer auxiliaries. Regarding the olive groves rinfittiti , fertilization in the case of young trees , must above all ensure the supply of nitrogen to be localized in the proximity of the young plants . Approximately, Buyers are on the order of 50, 80 , 120, and 160 g of nitrogen per plant , respectively, the 1st, 2nd , 3rd and 4th year after planting .

2.10 Check of the effectiveness of the applied fertilization schemes

The effectiveness of the amounts and types of fertilizers, selected on the basis of environmental and farming conditions (eg, soil management, productive potential of plants , etc.). Olive , must be assessed on the basis of the responses in terms of vegetative and productive plants and, if necessary , adjustments must be made progressive . The quantities and types of fertilizers made , you can consider when allowing the achievement of optimal production deemed appropriate in that environment and the culture conditions , while at the same time , an adequate renewal of vegetative shoots 20-50 cm long and without the emission of an excessive number of suckers , which represents the basis of the production of the following year . If the plants have a low production and have a limited vegetative growth , the amount of fertilizers to be administered must be increased. Conversely , if the plants have a strong vegetative growth with the emission of numerous suckers , the quantity of fertilizers should be reduced. Looking at the responses of plants, by successive approximations , we come to identify the pattern of optimal fertilization in the condition in which it operates. These adjustments have also been made tending to consider other practices that influence the growth and productive responses of plants (in particular , pruning and irrigation) .

As mentioned before , some guidance on the correctness of the choices made can also be drawn from the analysis of the soil, which should be done at least every 5

years.

2.11 Management of working

For an olive grove management that takes into account the need to preserve and improve the natural and environmental resources , while also taking into account the need to contain costs, we should pay attention to the mode of implementation and the number of processes. Such practices can sometimes be too harmful to the soil structure and biodiversity in general, as well as being a burden from the financial point of view . The choice to resort to machining for the management of the soil, this may be necessary in the case of rainfall and extremely reduced in the impossibility of having recourse to water supplies , although relief . In this case , the first work of the year , it may prove necessary after the harvest , when it may be appropriate to carry out a process to 10-15 cm for burying the organic and mineral fertilizers little furniture and facilitate the penetration of rainwater . In spring and summer, you can perform other processing 2-4 to 5-10 cm depth for the control of wild plants and the reduction of evaporation . It reiterates that , in order to limit the drawbacks of working , you can replace machining autumn with a mowing wild plants , in order to have the ground covered with grass in autumn - spring , ie , in addition to facilitating the access of the machines in the fields, and particularly useful in sloping ground in order to reduce erosion

3 . Irrigation

The remarkable resistance to drought due to different forms of anatomical and physiological adaptations that allow the olive to better deal with the majority of fruit trees , this adversity .

The water requirement of the olive and was estimated to be around 600 mm per year (ETc = 600 mm). In the case of rainfall which are around 600 mm per year , conditions that are found in most areas of the Mediterranean where the olive tree

grows , irrigation , while not necessary , can certainly help improve the vegetative-productive activities . This allows you to overcome any critical periods for the occurrence of high temperatures and drought at certain phenological stages , when the plants are more sensitive to stress conditions . In environments with rainfall less than that indicated above, the application of irrigation results in a significant improvement of the vegetative and yield . The olive tree , however , can survive and provide production , even under conditions of very low rainfall (<300 mm) and the trees, are well adapted to the environments in which they live.
In the past , irrigation was used only in case of real necessity . These plants , usually of considerable size , have very well-developed root systems that give them the ability to withstand difficult situations , conditions that result from lack of water or sudden flooding, due to erratic rainfall intensity.
The moments when the olive is more sensitive to water stress are:
– pre-flowering , flowering and fruit ;

– fruit growth by cell division (early hardening of the core from fruit) ;

– fruit growth for cell expansion (from the end of hardening the kernel and later) .

The seasonal irrigation volumes in the case of olive groves , in dependence of environmental conditions and cultivation , they can also get to 2,000 m3 in the case of intensive olive orchards but in the case of trees , even if irrigated , these volumes can be considered borderline cases for the reasons already given . The amount of water must be carefully defined , in a manner to be administered and as strictly necessary to ensure a good production and a good vegetative parts , without reaching excess situations that also determine conditions favorable to attack by pests.

Regarding the irrigation systems , and those in microspruzzo drop appear to be the most suitable because they have high efficiency and 90-95% of the water distributed , is used by plants . The drip systems , due to the low amounts of water , avoid the leaching of nutrients, do not wet the vegetation and thus do not give

unwanted pest attacks . These irrigation systems also reduce weed development as they bathe only small portions of land. For the same reasons and to avoid the sprinkler irrigation. Equally important is to avoid water stagnation, of which the olive is particularly sensitive, to an efficient irrigation system in some cases, must therefore be associated a system of collection and disposal of excess water which can facilitate the flow of water rainwater, especially during intense rains.

4 . Pest Control

The defense in olive groves with low impact and a control system of the harmful organism , using all the factors and techniques available , in accordance with the ecological , toxicological and economical principles, allowing you to keep populations below action thresholds , leading to economic harm . It is therefore, a control system which provides first interventions agronomic , physical , mechanical and / or biological and only if these are not able to guarantee an acceptable containment of parasites , recourse is made to the technical means . Therefore, in a olivicoltura low impact , it is essential to create the conditions to minimize the presence of harmful organisms. The latter are present in large numbers in the olive grove but in reality only some can endanger the profitability of the crop. The grower must know the potential harmfulness nell'areale insists that his company , only with this knowledge base can take to better crop choices , targeting them to the reduction of the harmfulness of the main pests. The following sections provide guidance for the control of major pests and pathogens that attack the olive tree,

The olive fly (Bactrocera oleae Gmelin)

Monitoring

Is carried out by installing sticky traps (yellow) and / or pheromones, in number of 2-3 / ha, half crown and checking the same weekly, in order to keep under control the evolution of the population of adults.

<table>
<tr><td colspan="3">Sampling
Since the beginning of hardening of the core, sampling 100 drupes weekly to determine the active infestation.</td></tr>
<tr><td colspan="3">Limiting factors</td></tr>
<tr><td>Natural factors</td><td>Agronomic factors</td><td>Artificial factors</td></tr>
<tr><td>Weather terms
- With temperatures Summer Above 36 ° C, has a mortality of eggs and larvae of the age up to 90% ..
- Low values of relative humidity (< 50%) are unfavorable the development of the insect.
Presence of enemies natural
Insects
Psyttalia concolor, Eupelmus urozonus, Pnigalio mediterraneus, Eurytoma martellii, Cyrtoptyx latipes, Lasioptera berlisiana</td><td>- Prefering small and early maturing drupa variety.
- For the management of the soil,
if possible, using the grassing of biotic communities to encourage beneficial insects.
- Managing carefully irrigation in order to make it less susceptible olives, in the moment of greatest risk of infestation.
- Avoiding application of a very intense pruning because, in addition to causing a reduction of the production, determines a concentration
the attack on the few olives produced, which, being of greater size, are more susceptible.
- Avoiding as much as possible, to leave on plants, fruits were not collected, because they promote the continuity of generations of the pest.
-Creation/mantening Of ecological infrastructures (eg hedges, trees, etc..)
With useful plants such as Acacia spinosa, Enula ceppitoni, Giuggiolo</td><td>Biocides
- Pyrethrum (adulticide)
- Azadirachtin (adulticide - larvicide)
Should be applied to the whole canopy .
Their limited efficacy and high cost limit its use .
- Spinosad
It is used with very low dosages and is reported as a product that has a high selectivity to the crop and on beneficial insects , allowing you to reduce the time of application and distribution costs as well as water consumption .
Its action is adulticide .
It can be applied in two different ways :
1) using knapsack with single jet and single nozzle , forming patches of 30-40 cm (5 liters of solution per hectare);
2) by means of pumps carried by a tractor by applying the product in a band of about 15 - 20 cm in width , with single jet and single nozzle (max. 15 liters of solution x Ha) .
E ' enough to treat 50 % of the plants (plants in a row and alternate) . You can start treatment at the first catch of adults or exceeded the threshold for intervention.
Protein baits
It is a mixture formed from protein baits activated with natural</td></tr>
</table>

	comune.	pyrethrins and is sprayed on a part of the crown in all plants , or on 50% of the same (by treating a part of the foliage of a plant and a no or plants of a row and one is not) , depending on the degree of infestation. The lures that attract adult feeding , are killed dall'insetticida . This technique presents problems in case of high infestations . In addition, if you are experiencing heavy rains , there is the washing away of bait that they should, therefore , be re-distributed **Repellents** Sulfur – - Sodium silicate - Clay (Kaolin) - Copper - based products (in all its forms) They must be applied to the first catch of adults. They are subject to leaching by rain , and therefore if washed , you have to repeat the treatment. The kaolin and especially , copper , have shown a good efficacy . The kaolin has a relatively high cost **Biotechnical means** Massal Catch - It done with traps positioned for a plant or one every two plants, on the south side of the crown , about 2 m in height , the first catches of adults. It is always advisable to place a trap on all plants along the perimeter of the plot. The trapping is to be adopted on large surfaces (minimum 5 ha) ,

		where it gives good results in the early stages of infestation of the fly and then only if the pressure of the insect does not become high. Given the high number of traps to be used , the cost of this system of control is high . **Types of traps used** - yellow chromotropic traps csmeared with glue , which attract the fly , as well as with the color , thanks to the ammonium bicarbonate and / or pheromone with which they are activated . - Traps food "Mac - Phail ," Catching flies attracted by ammonia produced by diammonium phosphate which are activated ; - Traps " Attract & Kill " , recently introduced , recall the flies through the action of a pheromone attractant and a food killing them for the work of the synthetic insecticides (deltamethrin or lambda- cyhalothrin) of which are impregnated . The use of these synthetic insecticides is allowed only for the traps used in mass trapping . **Biological Control** It can be done using the braconide Psyttalia concolor (Sz.) , throwing in large amounts of field insects reared (inundative method) . To determine the timing of the launch is necessary to make use of weekly sampling in the field of ripening in order to detect the presence of fly larvae susceptible (2nd and 3rd larval age) to parasitism by P. concolor . The

		results are not always encouraging results obtained and the high costs for the production of the parasitoid represent severe limitations to the application of this technique . chemical control The treatments to the entire head of hair are allowed a maximum of 2 curative interventions for the defense (control of larvae) with dimethoate , and imidacloprid Phosmet . For the first and second active ingredient, at max two interventions independently of the year , for the third one intervention per year, with only limited and oily dispersion formulation of olive oil .
The olive moth (Prays oleae Bern) **Monitoring** It is carried out by installing pheromone traps for the capture of adults, in number of 2-3/ha, half-crown and checking the same weekly, in order to keep under control the evolution of the population of adults		
Limiting factors		
Natural factors	**Agronomic factors**	**Artificial factors**
Climatic conditions - Temperatures above 27-28 ° C cause high mortality of eggs generation carpophagous. - Low values of relative humidity (<60%) lead to a reduction in the percentage of hatching eggs. - The occurrence of several days with	- Prefer variety to drupa small. - For the management of the soil, if possible, preferring to encourage revegetation biocenosis of beneficial insects. - Avoid the application of a pruning very intense because, in addition to causing a reduction in production, results in a concentration of moth attack on the few olives produced, which are also	**Biological Control** - Bacillus thuringiensis The only generation that is potentially harmful is the carpophagous one. The efficacy of treatment with B. thuringiensis on this generation is very limited, because the larvae born from eggs laid on the olives quickly penetrate into the fruit. Treatments performed with B. thuringiensis on the generation antofaga with the goal of reducing the number of adults who can ovideporre olives. in most

minimum temperatures equal to or less at 0 ° C determines high mortality of wintering larvae phyllophagous	more susceptible because, being few, are larger	cases, they have not given good results. **Chemical control** The chemical interventions with Dimethoate are justified only to the varieties at drupa big and only for the carpophagous deneration, for a max of one treatment
Cocciniglia mezzo grano di pepe (Saissetia oleae Olivier) **Monitoring** It is carried out visually for the presence of the insect in the branches. If the mealybug is present, it follows the evolution of the infestation on samples of 100 leaves collected at intervals during the period in which it might be useful to undertake treatments for insect control, they can also become very short (one week or less).		
Limiting factors		
Natural factors	**Agronomic factors**	**Artificial factors**
Climatic conditions Cold winters caused the death of many eggs and nymphs of the first, second or third age wintering determine large reductions in the presence of the insect. The high summer temperatures result in high mortality of nymphs of the first age. Presence of natural enemies **insects**:Chilocorus bipustulatus, Exochomus quadripustulatu, Scutellista cyanea, Moranila californica, Eublemma	- When you realize new systems is important to apply relatively "Large" plantation distances, which, by favoring the lighting and ventilation of the crown, determine not favorable conditions to cochineal. - The annual pruning, applied with the right intensity, resulting in good lighting and ventilation of the hair, prevents development of cochineal, while the two-year or multi-year, facilitating training clumps of vegetation, it favors. - Remove by pruning and destroying the parts attacked.	**biocides** - **Mineral oil** In case of presence of cochineal , it is advisable to intervene with treatments only if the number of live nymphs is , on average , higher than 4-5/foglia on a sample of 100 leaves . The mineral oil has a great effect if directed against the nymphs of the first age . Therefore, in the period from July to August , when the eggs under the body of the adult insects nymphs hatch, they must carry out the monitoring of the same, with reliefs at least weekly . When you have about 70-80% of hatched nymphs are running a treatment. Then , it is appropriate to repeat it immediately after complete hatching of the eggs. It is very important to carry out the treatments in such a manner as to ensure a uniform

scitula, Coccophagus spp., Diversinervus spp., Metaphycus spp., in particular M. swirskii, M. bartletti, M. helvolus e M. lounburyi. **Mushrooms** Cephalosporium lecanii e specie del genere Isaria	- Handle carefully fertilization (especially nitrogen) and irrigation, in so as to avoid excessive that by promoting an exuberant vegetation, determine favorable conditions the development of the insect	wetting of the foliage . If the infestation is concentrated on some plants , the treatments should be limited to infested plants . To assess the degree of hatching of eggs is appropriate to use one **Stereomicroscope** . chemical control To make up the year with two treatments Phosmet independently of the adversities
Oziorrinco (Otiorrhynchus cribricollis Gyll.)		
Limiting factors		
Natural factors	**Agronomic factors**	**Artificial factors**
Presence of enemies natural insects:*Forficula spp..* Nematodi entomopatogeni. Mushrooms: *Beauveria bassiana*.	- Leaving with some pruning suckers at the base of the trunk, so that the weevil, feeding on leaves inserted on these, not attack or attack less and later the foliage of plants.	**Mezzi meccanici** mechanical instruments - Barrier or protective bands . The adults of the olive weevil attack during the relatively cool hours of the day and during the night, while in the central part of the day took refuge in the ground under the trees. The control consists of applying around the trunk , or in large plants , around the main branches , fences or protective strips of wool or synthetic resin wool , insects that go on the tree remain trapped . For best results we must use bands of 20 cm in height , tied with elastic laces in the upper part , so as to form a funnel with the widest part facing downwards . The bands should also be applied around poles and guardians , if the olive grove has little irrigation system with drip off the ground , around the rods and the water supply pipes . The

		bands in wool or synthetic resin wool have a lifespan of 2-3 years. In the past they were used barriers or protective strips of plastic (the insect slips on them) or sticky (the insect remains stuck on them) . It should be noted that the first good results only if applied on a very smooth bark and create a warm and humid microclimate beneath the fascia that can modify the cortical tissues of the plant , while the latter , if the glue comes into contact with the bark of the plants, especially the younger ones , can give rise to phytotoxic effects . The glue applied on the pole brace often dries in a short time and , therefore , must be renewed more often than that applied to the plants. On the glue can also become trapped many beneficial insects , such as hoverflies , ladybirds and crisope . **Biological control** It can only be done using entomopathogenic nematodes against larvae or fungus Beauveria bassiana . The higher cost and lower effectiveness of safety with respect to the above-mentioned mechanical means usually do not make it convenient to use these biological means . **Chemical control** Chemical interventions are not allowed
Margaronia (Palpita unionalis Hb.) **Monitoring** They are available pheromone traps for the monitoring, but usually they are not used because the duration of the pheromone is very limited (maximum a week) and, therefore,		

<table>
<tr><td colspan="3">it would be necessary to replace the speakers very often with negative consequences on the costs. Therefore, it is preferable to monitor directly observing the plants.</td></tr>
<tr><td colspan="3">Limiting factors</td></tr>
<tr><td>Natural factors</td><td>Agronomic factors</td><td>Artificial factors</td></tr>
<tr><td>climatic conditions
- The insect does not fails to develop temperatures smaller at 9-10 ° C.
Presence of enemies natural insects:Syrphus corollae, Apanteles xanthostigmus, Nemorilla maculosa, Diptera and spiders</td><td></td><td>Biological control
- Bacillus thuringiensis.
In general, the insect does not cause significant damage on mature plants, whereas it can be dangerous on the young ones. On the latter, the occurrence of the attack, to prevent blocking of plant development in height, it must perform a treatment with B. thuringiensis that, in case of strong attack, it may be necessary to repeat after about 2 weeks.
The periods of greatest risk for insect are spring and late summer - autumn, so in such periods must be taken under the control plants</td></tr>
<tr><td colspan="3">Yellow Rodilegno (Zeuzera pyrina L.)
Monitoring
To monitor the presence of the insect are installed before the start of the flicker (April), 2-3 traps / ha pheromone, just above the treetops.</td></tr>
<tr><td colspan="3">Limiting factors</td></tr>
<tr><td>Natural factors</td><td>Natural factors</td><td>Natural factors</td></tr>
<tr><td>climatic conditions
- The insect does not grow up with temperatures smaller at 9-10 ° C.
Presence of enemies natural insects:Apanteles spp., Microdus conspicuus, Pristomerus</td><td>- By pruning the branches attached should be removed and destroyed
- Plants irrigated and fertilized in a balanced well contrast the insect.
- The vigorous plants can react to the attacks of Zeuzera producing exudates in the entrance hole of the larva, drying up, becoming</td><td>Biotechnical instruments
- Massal Capture
Is done installing , first beginning of the flicker (April), 8-10 traps / ha pheromone , just above the treetops .
The pheromone capsules should be periodically replaced. This control system is of application limits in the fact that the traps are rather expensive and should be carried out on large surfaces .</td></tr>
</table>

vulnerator, Rhaphitelus maculatus. Fungus Verticillium lecanii, Beauveria bassiana	crystalline, they can incorporate the small larva killing	**Biological Control** The use of nematodes Steinernema feltiae and biblionis and the fungus Beauveria bassiana , introduced in the gallery using special sticks with cotton tip (cotton fiocs) , can be effective in controlling the larvae , but the method is expensive. **Mechanical instruments** It's important to intensify checks of plants to identify possible entry holes of the larvae. Then , you insert a thin wire with a hooked tip into the hole until you reach the larva and kill her if you can take out the larva with the hook you will have the security of the result.
Rogna (Pseudomonas syringae sp. savastanoi Van Hall)		
Limiting factors		
Natural factors	**Natural factors**	**Natural factors**
	- Prefering varieties resistant to scab. - By pruning to remove preferably Partis so attacked to the bacterium. Make pruning in dry periods, trying to limit the big cuts. - Uring the collection, operate in a manner to minimize the injury to the plants. - Keep the plants in the best vegetative condition, performing balanced fertilization. - After a potato plant infected, disinfect	**Biocides** Copper Products (oxychloride , Bordeaux mixture , oxide or hydroxide) . You can not do healing treatments , so the defense against mange must be based on preventive treatments . The bacterium is spread through penetrating wounds , so if you experience events (hail, ice , etc. .) That cause damage to the plants should be carried out promptly treated with copper-based products , especially if the olive grove is composed of plants belonging to very cultivars sensitive to this adversity. On varieties susceptible to the

	tools for pruning before pruning another plant. You should prune past for infected plants	pathogen , if you are gathering with facilitators or equipment with mechanical beaters , which can cause injuries on branches larger than those caused by hand-picking , it may be appropriate to carry out a treatment with copper-based products immediately after harvest and in any case very short time , especially if the temperatures are mild and the relative air humidity is high. In infected plants it can be necessary to treat with copper-based products immediately after pruning .
Cicloconio (Spilocea oleagina Cast. Hugh)		
Limiting factors		
Natural factors	**Natural factors**	**Natural factors**
Condizioni climatiche Climatic conditions - Temperatures above 30 ° C or lower at 5-10 ° C represent a limit for start infections.	- Avoid planting varieties that are not resistant to the eye of the peacock in wetlands (eg at the bottom of the valley, near lakes, etc..). - When constructing a new olive grove, avoid planting distances that are too tight, when the plants are grown, facilitate the occurrence of shading and a humid microclimate within the canopy that promote atogeno. - The annual pruning, when applied with the right intensity, resulting in good lighting and ventilation of the hair, prevents development of the eye of the peacock,	**Biocidi** Biocides - Copper based products (oxychloride , Bordeaux mixture , oxide or hydroxide) In the event of heavy bouts of eye peacock in the previous year , highlighted by strong defoliation especially of the lower half of the canopy, carry out a treatment based on copper before vegetative to break down the inoculum . Then perform a second treatment to protect the new vegetation from the attack of the pathogen , always using products based on copper , in pre-flowering (15-20 days before flowering) , when in the shoots have formed the first 3-4 leaf nodes . In July-August, you should make an early diagnosis in order to determine the possible presence of new

	while the two-year or multi-year, facilitating the formation of clumps of vegetation, promotes the development of the pathogen. - Avoid sprinkler irrigation	infections is not yet manifest. If the test is positive you should schedule another treatment to be carried out in late summer - In the Early autumn , when typical stains caused by the eye of a peacock appear on the upper surface of the leaves. Early diagnosis is made by immersing a sample of 100 leaves, for 2-3 minutes , in a solution of sodium hydroxide or potassium to 5% , held at a temperature of 50-60 ° C for mature leaves and 20 ° C for the young leaves . In infected leaves appear small dark spots. chemical control The use of Dodina should be max for an intervention in a year .

5 . Olive collection

5.1 Period of collection

The time of collection must be chosen considering the evolution of the quantity and quality of the oil during the ripening of the olives. In choosing one can also take into account the efficiency in terms of yield (% of product seconded) and harvest times of the machines that eventually will be used to detach the fruits from plants , which depend mainly on the weight and resistance to detachment olives. The peel strength decreases during aging , making it much easier to fall off. In general, an early harvest results in the production of an oil characterized by a green color , a fruity, herbaceous and relatively high levels of bitter and spicy , the latter due to the high content of phenols . In fact , during maturation the phenolic substances , which are important antioxidant compounds that have both an antioxidant in the oil both in vivo after being ingested , the first increase and then decrease . A late harvest determines to obtain an oil with a less intense green or

yellowish and with a hint of fruitiness , bitterness and pungency relatively little intense . Oils with qualitative characteristics intermediate to those described are obtained by harvesting olives in the intermediate period . In general , the sensory characteristics of an oil are of high level up to which the pigmentation of the olives affects only the surface (skin) , while they tend to decay when the pigmentation also extends to the pulp (flattening sensory) .

During maturation , it also has a tenderizing of the olives that , consequently , they become more susceptible to mechanical damage , such as dents and wounds (which you can procure with the operations of collection and / or during transport and the eventual storage of the olives before processing in the mill) , which can promote the occurrence of processes of deterioration of the oil (eg. souring and oxidation) inside the fruit .

The quantity of oil obtained from the olive increases during ripening as a result of the increase of the oil content of the olive, but it must be considered that with the progress of maturation is also a loss of product due to the fall of the fruits (fruit drop) . Therefore, generally , in an early stage of collection you have more oils characterized sensory , but the amount is often not the maximum obtainable , during the middle you have a good quantity and quality of the product , during the late oils may show a flattening of sensory and there is the risk of a decrease in the quantity obtainable due to a strong fruit drop .

If you are in a PDO or PGI and want to certify the oil, the harvest period will have to be chosen considering as may be required by the product specification with regard to the period of collection and the analytical and sensory characteristics that must have l ' oil .

The evolution of fruit ripening and thus the quality of the oil and influenced the weather conditions and the position of fruits of plants which , therefore , must be taken into account in the choice of picking . In particular , in plants positions is a slowing down of the ripeness of the olives , while in those discharges it has an

acceleration of this process .

In case of late attacks to fly and should anticipate the collection to minimize the damage in terms of reduction in the quantity of both the quality of the oil , and what is particularly important in organic crop production . In cold environments may be advisable to anticipate the harvest to avoid the risk of damage to the fruit and then the oil caused by the occurrence of early frost , which can lead to the onset of sensory defect of " wet wood " .

Ultimately, the harvest period will have to be chosen in the light of the quantity and and lens manufacturing company : an early stage in order to obtain an oil strongly characterized by a sensory point of view and rich in antioxidants such as phenols (oil "new " oil or high nutritional value) , middle age and in some cases medium-late , for cultivars that have limited fruit drop , to get a standard extra virgin olive oil suitable for mass distribution , a period that best meets the requirements of the specification for produce oil PDO or PGI , etc. ..
It should be noted that there are cultivars that for their intrinsic characteristics to help the oil strongly characterized in terms of sensory and with a high content of antioxidants (phenols) in interim periods and medium-late harvest (eg Coratina) .
The execution of a collection at an early stage or medium-early , and generally recommended for the production of organic olive oil , considered the consumer of this type of product , usually, it takes over the safety and wholesomeness also a high level of quality product and that in anticipation of the collection you reduce the risks associated with late attacks of the fly.

5.2 Methods of collection

The quality of the oil and strongly influenced by the state of integrity of the olives , so the collection will be necessary in the execution of work so as to minimize the damage to the fruit. In fact, the bruises and wounds can put the oil inside the fruit

in contact with enzymes that can catalyze processes of alteration of the product (acidification and oxidation) , and can also promote the development of micro-organisms (eg molds) if olives are not processed immediately .
The olives are harvested from the ground or from networks previously stretched out under the trees and strongly discouraged because with these systems has a significant deterioration in the quality of the oils.
The collection must be performed from the tree and can be done:
– hand with the help of combs manuals and nets spread under the plants for the interception of the product;

– facilitators with equipment for the separation of the fruit, such as harvesters / rakes , grazers , hooks shakers , etc. . , And nets spread on the ground ;

– with vibrators applied to the trunk or branches , in dependence on the size of the plants , which in the case of application to the trunk can also be equipped with frame spoiler , thus allowing to also mechanise the operations subsequent to the detachment of the fruits ;

– with mechanical beaters (suction panels with oscillating or vibrating rods) applied to normal tractors for the separation of olives and nets spread on the ground.

The use of machines can cause significant damage to trees and advisable in these cases to limit their use. Such situations are not frequent and can be represented by barking in the case of vibrators trunk if the plants , due to a seasonal pattern very favorable, are still in the vegetation at the time of collection and numerous injuries on vegetation in the case of equipment and facilitators of mechanical beaters if the collection and performed very early, especially in fruits varieties characterized by small and high resistance to detachment that require prolonged action of the machines , and in both cases , consistent with the objective of production, the aforementioned drawbacks can be reduced postponing a little ' collection .
However, if the use of the machines and facilitators of mechanical beaters will

cause significant damage to vegetation may be appropriate, particularly in crops susceptible to mange , perform immediately after harvest treatment with copper - based products .

With regard to the damage to the olives , when using equipment facilitators for the detachment of the fruit must be careful not to step on the same sheets. The mechanical beaters in some cases cause more damage to olives than the others in the collection, but this usually does not cause a significant impact on the quality of the oil if the product is processed and made in a very short time . About the quality of the oil, generally , the use of machinery , especially in the case of vibrators , allowing you to focus (because of the high operational capacity that determine) the collection in the period that you chose to do this and practice and to have quantitative appropriate to bring to the mill in a short time , allow us to obtain objective productive oils highly satisfying .

5.3 Transformation processes and characteristic of oils and extracts

In the olive monitored , in recent years , in order to improve the quality of the oils for certification (PDO and BIO) , as well as conventional ones, are witnessing a radical change in the methods of processing of the product . In fact , the traditional system (muller + presses) and was progressively replaced by systems with crusher and centrifugation at two or three stages. Therefore, the extraction technologies , today are aimed at producing high-quality oils with the exaltation of the typicality of the product.

Analyze the various stages leading to the final product (oil) highlighting the methods used in the area.

5.4 Crushing of olives (pressing)

Depending on the type of machine used for crushing, the operation is called milling or crushing .The milling is carried out with the aid of the millstone, allows to obtain

a homogeneous paste and oils obtained are fruity with a less intense , less bitter and spicy and more harmonious on the palate.
These organoleptic characteristics are achieved provided that the time of milling , do not exceed 20-30 minutes in order to avoid excessive crushing of the pits .The crushing (hammer and disc) has the characteristic of elevating the working capacity by reducing the costs of management, but in contrast, heat the pasta . The oils obtained from this system , are more rich in chlorophyll (more green), more spicy and bitter due to increased tearing the epicarp in which it is subjected .

5.5 Kneading

The mixing has the task to promote the union of droplets drops more and more volume , favoring the flavor of the oil as a result of enzymatic activities that take place inside the dough. Pressing time are short (10' - 15 ') with temperatures ranging between 18 ° and 20 ° C in pastes from mills , as this phase is already initiated during the milling operations . The paste that comes from the mechanical crushers and subjected to kneading in more long time (30-50 min.) With a temperature of the water circulating in the jacket from 25 to 30 ° C.

5.6 Extraction of oil

In the extraction pressure , the paste of olives coming from the brakes through a dedicated dispenser stratifying , is distributed on diaphragms stacked in a tower equipped with a cart . The diaphragms are placed in pressure giving rise to an oily juice which is collected on the plate of the trolley. The duration of the squeezing varies from 30 to 60 minutes, and the maximum pressure is reached varies between 300 and 450 kg / cm ². In the continuous system , the olive paste is started to the decanter (horizontal centrifuge), obtaining the separation of oil , pomace and vegetation water , the effect of the centrifugal force and of the specific gravities of the three phases . The speed of rotation varies from 3000 to 4000 revolutions per minute . In the continuous system in three stages and need to add water at a temperature comprised between 25 and 30° while in the two-phase

system , oil and pomace , the separation of the oil from the paste is carried out without addition of water , and this allows to obtain more oils stable in time for a content in polyphenols similar to those of the pressure.

5.7 Separator (vertical centrifuge)

The musts coming from the oil presses or centrifuges are launched to the separator where the oil is separated from the vegetation remaining, by centrifugation.

5.8 Quality in the different extraction systems

From the qualitative point of view , the physical-chemical parameters , acidity , No. peroxides, spectrophotometric examinations , give very similar results. Regarding the level of total polyphenols , oils derived from the pressure are more rich than those by centrifugation. From the organoleptic point of view of oils obtained by the traditional system present with more subtle fruity , low bitter and spicy , harmonious as predominantly sweet. Oils obtained by centrifugation, have a more intense fruity , bitter and pungent most obvious feelings that tend to fade over time.The mining industry of olive oil produces two types of products: vegetable water (liquid effluent) and olive pomace (solid effluent) .

5.9 Vegetation Water (V.W)

The V.W. derive essentially from the water naturally contained in the olives, and , in many cases , also water added during the washing phase of the olives and installations, as well as the one eventually added in the extraction process . The quality and quantity of V.W. vary according to:
1 . composition of V.W., dependent on the quality of the olives depending on the variety , degree of ripeness, the water content and the soil and climatic conditions;
2 . extraction process of the olives and water added in the various phases (washing, etc.).

3 . duration of storage of the olives before milling that can determine if prolonged , the triggering of anaerobic and anaerobic processes that lead to an alteration of

organic compounds.

For the reasons stated , the quantity and quality of the V.W. can vary considerably. The amount produced varies on average from about 40 to 60 liters in conventional plants discontinuous , while in the systems with three phases from 80 to 100 liters per 100 kg of olives . The wide range, for each of the technologies , and function of the added water and the washing water . In any case , the V.W. produced by the plants in the three phases are more dilute than those produced by traditional pressure systems. The two-phase extraction systems do not produce V.W. From the microbiological point of view , in V.W. are bacteria, fungi and yeasts as well as lithic cellulose , while the nitrifying are absent .
Even from the qualitative point of view , the V.W. do not contain pathogenic micro-organisms or toxic substances but have a high salt content and SO is a high acidity . In V.W. there is a significant variability : they generally have a dark-brown color , with a pH between 4.8 and 6.0, and a solids content of between 6 and 17% . About 85 to 88% of the residue and consists of organic substance (with 2% of organic nitrogen) while 12-15% inorganic compounds including potassium (6 - 12%) and phosphorus (1-3 %) .

From the data presented it is evident the potential agronomic value of V.W. : utilizzarne assuming 50 m3 with a solids content of 10% are made to the ground about 85 kg of nitrogen, 90 kg of potassium, phosphorus 15 kg and 4000 kg of organic . Unfortunately, the re- cultivation of V.W. as such can cause problems due essentially to four aspects:

a) potential polluting effect evidenced by the high values of COD and BOD ;
b) a high content of organic matter to the soil made fresh that may cause alterations in the quality of native soil organic matter as well as a decrease in the nitrogen content (priming effect) ;

c) high content of phenolic compounds with phytotoxic effect ;
d) high salinity .

Over time, various approaches have been proposed thesis to the resolution of the problem: real purification processes using different technologies (ultrafiltration, incineration , concentration, etc. .) But that would not guarantee a reduction in the rate polluting the levels determined by the rules of law , processes of recovery of substances used in food or pharmaceutical (especially phenolic compounds and sugars) , to catalytic processes aimed at improving the quality of organic matter and reduce the phytotoxicity . The effectiveness of these processes are low and pear demonstrated by an economic point of view , since the benefits obtained contained a considerable cost is required, both in terms of investment for installations for both a high production of energy consumption in the various systems that constitute the fact a cause of pollution.

At the same time numerous scientific- experimental tests , carried out by many researchers in various countries, showed how the V.W. mode and with controlled doses , could be used as such in the soil as a soil improver.

In particular, considering traditional extraction systems , doses up to 100-150 m3 for most tree crops and 50-80 m3/ha for many herbaceous crops (in pre - implantation) can be used without a negative impact on quality of the soil and productions .

On the basis of scientific tests , in Italy since 1996 (Law 574 /11 11/1996 and subsequent amendments and supplements) and was allowed , the spreading of the V.W. as such on agricultural soils to a maximum of 50 m3/ha/anno for those from crushers and traditional cycle of 80 m3/ha/anno those from mills around the clock, with the requirements of the mode of spread and limitations compared to duration of storage, the location of the soil, the type of crop in place and the possible presence of water . In order to avoid phenomena of phytotoxicity or pollution of the soil, as well as the quantity , of paramount importance that the step of spreading should aim to distribute in a more uniform as possible the volume of V.W. administered in order to avoid accumulation in certain areas of the plots . After administration and good to proceed to processing for the landfill not before

20-30 days , so that the contact with the air and the resulting oxidation further reduce the pollution load due to organic matter . To date, the use of the V.W. as such as soil improvers , with the limitations described above , is the most rational method to solve the problem of disposal.

Olive pomace

The system of extraction of oil extraction significantly influences the amount you pomace produced . In fact, the moisture content in the Olive pomace varies from 20-25 % in conventional plants pressure to 40-50% in those with three stages , up to the 55-70 % in those two stages . The qualitative composition as well as the type of system and also influenced by the characteristics of the olives. The S.V. has an average composition , based on dry weight , of more than 90% organic matter , 1 - 1 .5 % of potassium and phosphorus in the 0.2-0.4 % . For this product, the potential agronomic and partly affected by the same problem view for V.W. (phytotoxicity) . Currently the Olive pomace produced is , for the most part, attributed to processors that proceed the residual oil by solvent extraction . The residue " exhausted " remaining after the extraction and generally used as a fuel , subject to certain constraints of a legislative character and the problem of disposal of incinerator ash which are in effect a refusal. In addition to this mode of disposal of the applicant's product alternatives are possible :

a) the current legislation, already cited for the V.W. , allows the use of the Olive pomace as such on the ground without setting limits quantities. It 'clear that , although there is a legal limit , the amount to be used must be carefully evaluated based on the characteristics of the residue , soil and crops.

b) in order to prevent problems with the '' use as such as fertilizer , and established practice to submit , along with other matrices , the Olive pomace in composting processes in order to " ennoble " agronomically and obtain a high value product improver and low environmental impact. Numerous experiments have shown the valid formulation mixed with straw and manure , arrays, easy to

find and low cost ;

c) use in low percentage , together with peat and other matrices, for the formulation of growth substrates within the nursery ;

d) extraction of compounds of interest in food or pharmaceuticals ;

e) production of peanut residue obtained by virgin machine (separating of peanut) without the aid of chemicals or solvents. The resulting product , is a fuel with a high calorific value, and therefore completely environmentally friendly , unlike those produced by depleted pomace , can be sold for domestic use with an excellent calorific value / price , by far the most cost-effective compared to ' use of the pellets (saving up to 50 %) the yield in nocciolino varies from 12 to 20 % (in according to the type of machine used) and is slightly higher for the Olive pomace resulting from installations in three stages than in two phases. Given the cost of purchase of the machine and its operating costs , this solution is only valid for mills with high production

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