



FERTILIZATION OF RAINFED OLIVE GROVES



WHY MIGHT OLIVE GROVES REQUIRE AN EXTRA SUPPLY OF NUTRIENTS ?

Replacing nutrients that are removed with the harvest operations is essential to achieve long-term production stability, and to secure that trees become more resistant to stress caused by frost, drought, pests and diseases. This is the ultimate objective of fertilization. However, fertilization **is not a routine like any other**; olive farmers need to manage it properly, especially if we consider that the costs of fertilization represent **between 5 and 10% of the total costs of olive production**. Thus, when overfertilization occurs, along with triggering environmental problems, it implies that olive farmers **can be wasting their money**.

REMEMBER THAT...

In addition to macronutrients (nitrogen, potassium and phosphorus), olive trees need adequate levels of micronutrients, among which boron, zinc, iron, magnesium, manganese, copper and calcium stand out.

When rainfall records are low, agricultural production does not usually respond to fertilization because water becomes the limiting factor (nitrogen enters the tree along with water).

HOW MUCH NUTRIENT IS REMOVED WITH HARVESTING ?

It becomes difficult to answer this question since nutrient removal is a highly variable process that depends on a number of interconnected factors: productivity, soil characteristics, weather conditions, tree density and age, etc. However, as an estimate, for every ton of olives that reaches the mill, including the leaves also collected during the harvest, approximately **10 kg of potassium, 5 kg of nitrogen, and about 1 kg of phosphorus** are removed from olive trees.



This is however a small loss of nutrients when compared to other crops, since half of the olives consist of water and most of the other half are fatty acids that basically contain carbon, hydrogen and oxygen.

HOW MUCH NUTRIENT DOES AN OLIVE GROVE REQUIRE ?

To produce 3000 kilos of olives per hectare, an olive grove needs the following amounts of (macro) nutrients (per hectare and year):



In addition to the nutrients involved in olive production, olive groves require nutrients to produce flowers and new leaves and to develop the different woody structures of the tree. Flowers and new foliage production require **about 21 kg of potassium, 15 kg of nitrogen and 1 kg of phosphorus per hectare and year**.

THE COMMON QUESTIONS

WHEN ?



Considering that most of the nutrients fostered by the trees are available in the leaves, the greatest demand for nutrients by olive trees should take place between mid-March and May.

AVAILABLE SOURCES ?



A first option includes **synthetic chemical fertilizers** such as triple fertilizers (such as 15:15:15 - N:K₂O:P₂O₅) or urea and, alternatively, olive farmers can use **organic fertilizers** such as manure, composted olive mill pomace and other local organic fertilizers.

HOW MUCH and WHERE ?



For synthetic fertilizers, if a production is expected within the usual (consider 3000 kg of olives per hectare) and rainfall is within the average values:



Fertilizers can be applied to the soil, under the canopy of the olive trees, at the end of winter but only as long as weather forecast does not foresee medium-intense rains during the following 2-3 weeks.

In the case of manure, we recommend applying about 3000 kg per hectare, uniformly distributed after harvest and before the end of April. In the case of composted olive mill pomace, click here [extra info](#)

THE CONS

- Tree demand and nutrient application are usually asynchronous.
- When doses become excessive, problems of contamination of water bodies and greenhouse gas emissions can take place.
- The farmer is required to understand the information contained in the packages and the technical and safety datasheets of the products.
- Farmers' dependence on external inputs is increased.
- Nutrient contents are highly variable.
- Nutrients are only available in the medium (weeks-months) to long term (1-3 years), depending on the type of organic fertilizer.
- In some locations, supply capacity may be limited.
- Manure can act as a source of pathogens if not composted properly.
- Application over larger areas can become complicated.
- In line with global markets, fertilizers can have non-competitive prices.

THE PROS

- Nutrients are available to the tree almost immediately.
- Formulations include balanced contents of both macro and micronutrients.
- Application is fast and simple.
- They facilitate the design of fertilization programs because nutrient contents are well known and homogeneous.
- They contribute to promoting the circular economy, based on the recycling and reuse of local resources (olive mill pomace and manure).
- Availability of nutrients is synchronized with their demand.
- They incorporate both macro and micronutrients.
- They promote nutrient retention mechanisms within the farm.
- They improve soil fertility (organic matter and micronutrients).
- They improve the capacity of soils to storage water.
- They can potentially contribute to mitigating climate change.

CHEMICAL FERTILIZERS

ORGANIC FERTILIZERS

KEEP IN MIND THAT...

- 1 It is essential to read and understand the labels.

FERTILIZER NPK 25 - 20 - 10

If 1 kg of this product is applied to each tree, it would be contributing 250 gr of N, 87 gr of P and 83 gr of K.

25, 20 and 10% of the weight of the product corresponds to nitrogen (N), phosphorus (P) in the form of P₂O₅ and potassium (K) in the form of K₂O, respectively. Specifically, the net percentages of each nutrient are 25% for N, 8.7% for P, and 8.3% for K.

[extra info](#)

- 2 Soils in olive groves also supply nutrients.

It is very complicated to estimate how much potassium and phosphorus can be supplied by soil. However, it is possible to estimate the amount of available nitrogen that soils provide to the trees. This amounts to about **20-40 kg per hectare and year** when the first 30 cm of soil contain **1% organic matter** (it would rise to **35-65 kg** if the **organic matter content is 2%**). Unfortunately, this available nitrogen is not produced when the tree most needs it, but irregularly throughout the overall agronomic year.

[extra info](#)

- 3 Supplying nutrients through fertilization does not guarantee a direct response (much less proportional) in terms of crop productivity.

Nutrient use efficiency rates (the proportion of the supplied nutrients that are effectively used by the crops) are relatively low in the olive groves. One key reason for this is that **the root system of an adult olive tree in dry conditions is capable of reaching many cubic meters of soil** (~10 m³ can be considered as a likely value) and, therefore, feed from many tons of soil. The pool of nutrients that olive trees take from this high volume of soil cause the effect of those provided with fertilization to be considerably diluted.