



ARISTOIL

GUIDE for producers

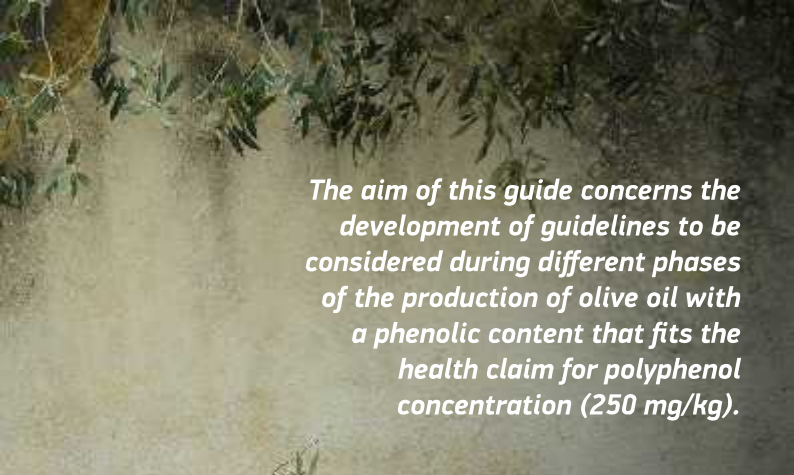
Extra Virgin Olive Oil
with health protective properties



ARISTOIL

The main objective of ARISTOIL is the reinforcement of Mediterranean olive oil sector competitiveness through development and application of innovative production and quality control methodologies, leading to olive oil with enhanced health protecting properties (as recognized by EU 432/2012 regulation). The development of a Mediterranean Cluster for olive oil producers and businesses, combined with specialised training, development of innovative methods for identifying the phenolic ingredients of the oil, as well as oil producers' support by special product certification, is the mixture which will lead to the project's objective.

Phenolic compounds belong to the minor fraction of olive oil and stand out as being exclusive to olive oil. Speaking of phenolic compounds means referring to virgin olive oil or, especially, extra virgin olive oil (EVOO) since both categories are directly obtained from the olive fruit, and exclusively by



The aim of this guide concerns the development of guidelines to be considered during different phases of the production of olive oil with a phenolic content that fits the health claim for polyphenol concentration (250 mg/kg).

means of mechanical procedures. Polyphenols contribute to the organoleptic properties of EVOO through attributes such as bitterness and pungency. As a result of their antioxidant properties, polyphenols provide oxidative stability and preserve olive oil.

Phenolic compounds have an outstanding nutritional interest recognized by the European Food Safety Authority (EFSA) and embodied in the 432/2012 European Regulation, which includes the health claims associated with the consumption of food components. The health claim refers to the protective role of phenolic compounds against the oxidation of blood lipids, one of the main mechanisms involved in the development of cardiovascular diseases. This beneficial effect occurs when 20 g of olive oil with a minimum content of 250 mg of phenolic compounds per kg of oil are consumed daily.

Prioritize extra virgin olive oil

The guidelines for the production of EVOO are the best reference to obtain a product with high phenolic content. Any anomaly that occurs before, during or after harvesting can have a significant effect on the antioxidants content, with special emphasis on polyphenolic compounds. Obviously, the weather during the harvest period is a key aspect in this regard to ensure the quality of the olive fruit. A crucial aspect is the collection of high-quality olive fruits and, for this purpose, the protection of fruits in the orchard against pests and diseases is essential.

For good quality
EVOO production,
the standard procedures
must be followed to
ensure...





①

Protection of the
fruit in the orchard
against pests and
diseases

②

Optimum
harvesting time
associated with
the appropriate
ripening index

③

Maximum hygiene



Cultivars

Any cultivar is able to provide extra virgin olive oil with polyphenolic content that exceeds the threshold established in the 432/2012 European Regulation.

However, orchards with traditional and endemic olive groves that stand out for a wide varietal richness have been found to produce olive oil high in polyphenols.



Irrigation



The phenolic concentration of olive oil from irrigated olive groves can be 50% lower than that observed in rain-fed olive groves, considering the same cultivar.

Subjecting olive groves to water stress days before harvesting has been shown to lead to an increase in the polyphenolic content of these oils



Harvesting

This depends greatly on the variety and climate of particular year (precipitation, temperatures etc.). As a general rule, producers should avoid late harvest.

The olive oil producer, should also take into account that the ripening degree is directly related to the oil content that he gets from his olive fruit which is also a crucial factor for the final profit. The oil content may double from September to January.

At the olive mill

The choice of an appropriate olive mill is fundamental and a number of considerations, listed below, should be taken into account for the malaxation process.

- Minimise time between harvesting and malaxation (no more than 24 hours)
- 2-phase extraction system clearly favours higher phenolic concentration as compared to the 3-phase system
- The amount of water provided in the 3-phase system greatly limits polyphenol compounds in the oil, which accumulate in the alpechin phase, so that their concentration in the oil decreases when the amount of water increases



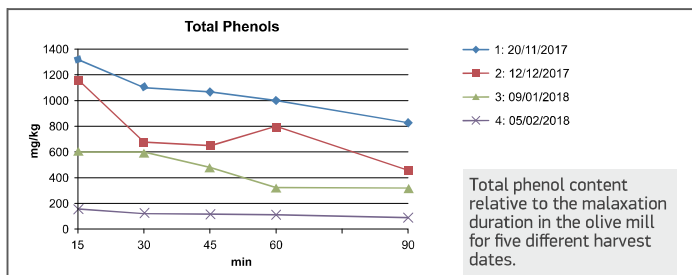


Malaxation temperature

Ideally, it should be controlled by a thermostated system. The malaxation temperature must be sufficiently low to minimize the enzymatic biotransformation of the polyphenols by the action of peroxidases and phenoloxidases. This biotransformation is minimized if the temperature of the process does not exceed 28°C. On the other hand, the enzymatic activity of glucosidases and esterases, the main enzymes involved in the biotransformation of oleuropein and ligustroside, does not trigger below 24°C. Therefore, the temperature range to be controlled (for the entire extraction process) is very narrow (25–28°C).

Duration of malaxation

The general trend is that the malaxation time should not exceed 45–60 minutes, although it is a parameter that depends on the cultivar and would ideally be below 30 minutes.



Storage & packaging

After the olive oil extraction, it is preferred to filter the olive oil. The reason is that the presence of water or other residues inside olive oil for long will lead to hydrolysis of the phenols.

The use of opaque containers made of any inert material are suitable alternatives to ensure the concentration of phenolic compounds for a longer time.

When the product is stored in large tanks, their thermostatisation and inertization with nitrogen are highly recommended practices to maintain the polyphenol concentration at its initial levels.

Olive oil should be stored
in tanks made from an inert
material at a stable low
temperature (under 18⁰C)
in the absence of oxygen,
light and humidity.



<18°C

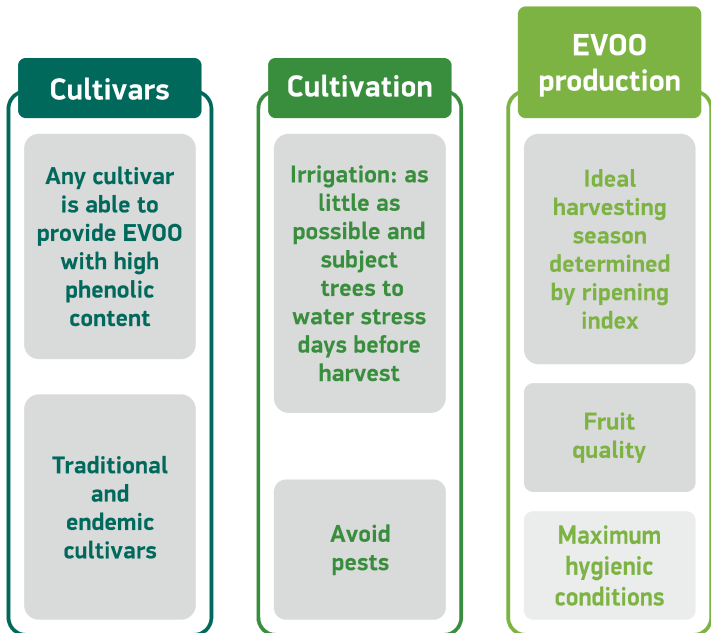




Cooperativa Andaluza Olivarera La Purísima, in Archidona, Spain. Containers made of inert materials and mechanically controlled conditions.

Conclusions

The diagram below, summarises the most fundamental guidelines for producers, aiming at the production of EVOO with increased health protection properties (polyphenol concentration of over 250 mg/kg).



Guidelines for production of EVOO with polyphenol concentration greater than 250 mg/kg (associated health claim, according to the European Food Safety Authority and the 432/2012 European Regulation).

Harvesting

At the onset of colour-change “Veraison”

Minimum time between harvesting and processing (<24 h)

At the olive mill

Two-phase extraction system

Phenolic concentration decrease with the increase of water

Malaxation temperature 24-28°C

Malaxation time up to 45 min

Storage & packaging

Filtering

Opaque containers made of inert materials

Stable low temperature (<18°C)

Absence of air and light

Inertization with inert gases

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Project co-financed by the European
Regional Development Fund

The guidelines were based on analysis by the three University Departments participating in the Aristoil project (Department of Analytical Chemistry of the University of Cordoba, Department of Pharmacognosy and Natural Products Chemistry of the University of Athens and Faculty of Chemistry and Technology of the University of Split) and the different results provided by the five countries participating in the project (Spain, Italy, Croatia, Greece and Cyprus).