



Polyphenols and Antioxidants in Olive Oil

Antioxidants and Polyphenols

Olive oil contains polyphenols, vitamin E, and other natural antioxidants that are the oil's own natural preservatives. Antioxidants dampen the auto-generation of peroxides, delaying the onset of oxidation and rancidity. As a result, antioxidants increase the oil's shelf life.

Among the antioxidants, there are compounds that have been associated with human health benefits. They absorb free radicals and appear to have a positive impact on cardiovascular and cancer ailments, as attributed to the Mediterranean diet.

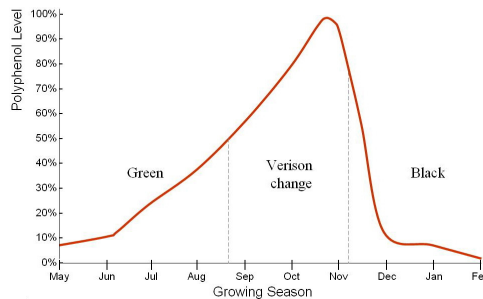
Polyphenols are an important class of antioxidant in olive oil. More than thirty polyphenols have been identified in olives. **Total Phenol** value (or Total Polar Phenol value) is their aggregate measure.

Polyphenols in Olive Oil

Polyphenol levels decrease during milling and storage. Many polyphenols are water soluble and are lost with the vegetation water during processing. In addition, polyphenol levels will slowly decrease during storage, as they dampen oxidation in the oil.

Given these unavoidable losses, an initial high polyphenol level is essential for ensuring longer shelf life and greater health properties. Blending oils may be an alternative for adjusting polyphenol levels.

Olive Fruit Polyphenol Level and Color During the Growing Season



Polyphenols in Olive Fruit

Polyphenol levels in olives depend on climate, variety, agricultural practices and ripeness at harvest.

Olive **varieties** with high phenol content include Cornicabra, Coratina, Moraiolo and Koroneiki, while Arbequina, Picudo, Sevillano and Taggiasca have low phenol content.

Polyphenol levels in the fruit are affected by **irrigation** during the growing season: thrifty watering increases the phenol level.

Since polyphenol levels naturally decrease as the olive fruit ripens (see graph), **harvest time** affects their level in the oil: early harvests result in oils with higher polyphenol values.

Polyphenols and Health

Studies of the Mediterranean diet suggest that oil polyphenols deliver key health benefits. Polyphenols absorb free radicals and have a positive impact on cardiovascular disease and certain forms of cancer. They also act as anti-inflammatory, as confirmed in clinical studies.

Polyphenols and Oil Style

Polyphenols correlate with key sensory oil properties: bitterness and pungency, which are associated with olive oil style. Olive oil classification as **mild**, **medium** or **robust** can be associated to the total phenol content.

Robust olive oils tend to have a Total Phenol level above 300 mg/kg, while oils perceived as mild have levels below 180 mg/kg.

Thus, oil analysis measuring Total Phenol gives producers guidance for labeling their oil.

Bitterness Intensity	Total Phenol*
Non bitter	< 220
Lightly bitter	220 to 340
Bitter	340 to 410
Very bitter	> 410

* Unit: mg/kg Caffeic acid equivalent

Total Phenol Analysis

Laboratory results for Total Phenol can be expressed in different units: **"milligram equivalent of Gallic (or Caffeic) acid per kilogram of oil"** (mg/kg) or "micrograms of phenols per mg of oil". Results in either unit must be converted for comparison.

Total Phenol levels in virgin olive oil expressed as Gallic acid equivalent range in value from 50 to 800 mg/kg. Most oils have phenol levels around 180 mg/kg.