P.O. Box 144345 Austin, TX 78714-4345 ▪ 512.926.4900 ▪ Fax: 512.926.2345 ▪ www.herbalgram.org

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File: ■ Olive (*Olea europaea*)
■ Mediterranean Diet

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RE: Review of the History, Chemistry, and Potential Health Benefits of Olive and Olive Oil

Uylaşer V, Yildiz G. The historical development and nutritional importance of olive and olive oil constituted an important part of the Mediterranean diet. *Crit Rev Food Sci Nutr*. 2014;54(8):1092-1101.

The olive (*Olea europaea*) has been regarded as a symbol of peace and has played an important role in many ancient civilizations. The origins of the olive tree have been traced back to 3150-1200 BCE in the Mediterranean region including Turkey, Syria, Lebanon, Palestine, and Israel. The primary direction of cultivation and trade of olive trees expanded westward to Turkey, Egypt, Greece, Italy, Northern Africa, and eventually to Southern France. Although there are around 600 species in the olive oil family (Oleaceae), this review focuses mostly on *O. europaea*, the only cultivated species.

Based on reports from 2011, it has been found that most of the olive trees are used for olive oil production (90%) and the rest are harvested for table olives. Moreover, about 81% of olive oil production comes from European countries, followed by North Africa (11%), the Near East (7%), and the Americas (1%). Furthermore, the majority of table olives come from European countries (34.1%). In the past, olive oil was primarily used as a lamp fuel (from late 19th to 20th century), whereas in the 21st century, olives are more valued for their dietary and nutritional qualities.

Olives are single-seeded fruits (drupes) that vary in size, shape, oil content, and flavor. Table olives are harvested in mid-autumn, whereas olives used for oil production are harvested when they turn black in the late autumn or winter. Oleuropein is the bitter component of olives that require these fruits to be processed before consumption. The most common processing methods used to make the fruits more palatable include the following: the Californian processing methods, the Spanish processing method, a natural fermentation/brine method, and the Greek processing method. Some of these methods involve fermenting, washing, brining, adding sodium hydroxide, adding iron-salt, and/or air oxidizing the olives.

Olives
Olive and olive oil consumption are associated with nutritional and medicinal effects, which may be attributed to phenolics, and to a lesser extent to the tocopherols and monounsaturated fats. Phenolics function as antioxidants, which provide health benefits and

aid in food preservation. Phenolic content varies depending on the processing method (e.g., fermentation), cultivar type, irrigation methods, and the degree of maturation. Some of the phenolics identified in table olives include tyrosol, hydroxytyrosol, oleanolic acid, and most predominantly, oleuropein. In addition, numerous other polyphenolics have been identified in olives. As olive fruits mature, oleuropein and the total phenolic content generally decrease, whereas tyrosol and hydroxytyrosol increase. The antioxidant activity of olives are dependent on the structure of the phenolics (hydroxytyrosol has higher activity than tyrosol), the color of the olive (black olives have more antioxidant activity than green olives), the type of olive cultivar, as well as the harvest season. In terms of medicinal uses, olives have been used to protect against cardiovascular and gastrointestinal disorders. Olives have also been shown to have beneficial effects on conditions such as cancer, constipation, diabetes, rheumatism, and have exhibited antimicrobial activities.

Olive oil

Edible olive oils are categorized into six different types of grades: extra virgin olive oil (acidity up to 0.8% with oleic acid), virgin olive oil (acidity up to 2.0%), refined olive oil (less alpha-tocopherol and squalene than virgin olive oil), olive oil (a mixture of refined and virgin olive oil), refined residue olive oil (same triglyceride composition as virgin olive oil with less phenolics but with more oleanolic acid and erythrodiol), and olive residue oil (a blend of refined residue oil and virgin olive oil).

Virgin olive oil consists of two major fractions, with the larger fraction consisting of triacylglycerols (mostly oleic acid and some linoleic acid) and the smaller fraction consisting of compounds such as tocopherols, sterols, triterpenic dialcohols, and phenolics. Similarly to table olives, the phenolic content of olive oil varies depending on many factors including extraction and separation techniques. Most of the phenolic content of virgin olive oil consists of tyrosol, hydroxytyrosol, and their secoiridoid derivatives (e.g., oleuropein). These phenolic compounds are important for the stability of the oil, antioxidant effects, and may contribute to anti-inflammatory and antiatherosclerotic effects.

The cardiovascular benefits of olive oil are usually attributed to the high level of monounsaturated fatty acids; however, other phytochemical components probably also contribute to these effects. Some of the biologically active components of olive oil also include phenols, alpha-tocopherol, and squalene. As with phenolics, the fatty acid content of olive oil depends on a number of factors (e.g., cultivar, climate). The most prominent fatty acids in olive oil include the monounsaturated oleic and palmitoleic acids, as well as the polyunsaturated linoleic and linolenic acids. Out of these fatty acids, oleic acid generally has the highest concentration in olive oil. The fatty acid profile of olive oil determines the quality of the oil and is also used to classify the oil (e.g., can determine cultivar differences).

Both table olives and olive oil are important products of the Mediterranean region and are one of the major foods that are linked to the health benefits of the Mediterranean diet. The authors describe numerous factors that may contribute to the phytochemical diversity of olive products. Such information is important because some of these differences may have an impact on their purported health benefits.

—Laura M. Bystrom, PhD

The American Botanical Council has chosen not to include the original article.