Olives to Olive Oil

Have your oil and eat olives, too! Learn how olives are grown and processed into the elixir of the gods.

By Alexandra Kicenik Devarenne

About the Author

Alexandra Kicenik Devarenne is an olive oil researcher, taster and educator in Sonoma County, Calif. Contact her at adevarenne@yahoo.comWhen Rip Van Winkle went to sleep back in the 1970s, olive oil was something you cooked with occasionally. When Rip woke up in 2007, olive oil was the talk of the town: at the kitchen table, in foody magazines, in health news. And people were passionate about it.

Maybe it was the result of more folks traveling to Southern Europe and having their hearts stolen by the silvery trees with the golden juice. Whatever the reason, olive oil and olives are definitely hot.

Providing resources to meet all the tree's needs during a heavy-crop year will ensure better shoot growth for fruit production the following year.Written records of olive cultivation date back to 3000 B.C. in Syria; from there olives spread through Egypt and Crete to the ancient Greek and Roman world. References by Homer in 900 B.C. show olives and olive oil to be important parts of the culture.

The olive came to the United States with the Franciscan fathers and followed the missions north. The earliest written record of domestic olive oil production is from 1803. The first commercial olive oil mill was most likely established in Ventura County, Calif., in 1871.

Unable to compete with low-priced oil from Europe, the California olive industry turned its attention to table olive production around 1900. Table olives dominated the domestic olive scene for over three-quarters of a century.

Resources
Sonoma County UC Cooperative Extension olive page: (many handouts on olive oil and olive production, as well as an olive oil newsletter, First Press)

Olive Production Manual, 2nd Edition, University of California ANR Publication #3353
(the “must-have” book on growing olives)

UC Pest Management Guidelines
(frequently updated information on pest management)The California olive-oil renaissance began in the late 1980s when a small number of growers began to produce high-quality olive oil for the gourmet market. For the first time in many years, olives were planted specifically for oil. Since then, the number of acres of olives in California being cultivated for olive-oil production has risen to over 10,000. During the same period, acreage of table olives has declined, largely due to competition from inexpensive imports in the California-style black olive market.

For years the domestic olive-oil industry was essentially a salvage operation using culls from table-fruit production, but this new olive-oil industry is producing world-class extra-virgin olive oil.

Anatomy of an Olive Tree
Olive trees are shallow-rooted, long-lived and evergreen. Trees are sometimes hundreds of years old and have been said to live 1,000 years. The fruit is borne on wood grown the year before, making olive trees prone to alternate bearing. When supporting a large crop of fruit, a tree lacks the resources to produce much new wood resulting in a light crop the following year. This permits the tree to produce a lot of shoot growth one year and a heavy load of fruit the following year.

Alternate bearing can be ameliorated with careful management aimed at supplying the tree with plenty of resources when it's supporting a large crop and pruning when there is an overabundance of flowers (an "on" year).

Modern high-density spacing is suitable for all varieties and varied terrain.Olives are largely self-fruitful, but the presence of pollinator trees can improve fruit set. This is particularly important when weather conditions are less than optimum; certain varieties should always have pollinators.

Olive trees are tough. They were grown traditionally in locations unsuitable for much else: steep hillsides, areas with poor soil and places where water was scarce. But that does not mean that olives will grow anywhere: Although tough as nails in many respects, they are intolerant of certain conditions. Temperatures below 22 degrees F can damage small branches, and large branches and trees can be killed below 15 degrees F.

Some varieties are more sensitive than others, but no olive can be considered truly cold hardy. The fruit is even more sensitive; freezing before harvest can seriously damage the crop, resulting in off flavors in the oil.

The Economics of Olive Oil

Bring up the topic of making money among domestic olive-oil producers and you'll probably hear the adage, "Do you know how to make a small fortune on olive oil? Start with a big one!" Is that really the case? It can be. The costs to produce olive oil are high and competition in the marketplace is fierce (see "What makes an Olive Oil Extra Virgin?" for the import dilemma), but super-high-density (SHD) planting can greatly reduce harvest costs and bring a quicker return on investment. The yields per acre for both SHD and high-density should be similar in well-managed mature orchards, in the vicinity of five tons per acre (this can be much lower or higher depending on many variables). Oil yield is hugely variable also, from 12 to 15 gallons/ton for low-oil varieties to 40 to 50 gallons/ton for high-oil cultivars. Processing is around $400/ton.

There are ways to improve the economics. Direct marketing is one; the added value of growing organic is another.

Differentiating your product from the other premium olive oils is a challenge. Consider the angles: regional loyalty (Eat Local!), uniqueness (unusual varieties), awards (medals suit any bottle), specialty table olives in addition to oil … exercise your marketing imagination! The bottom line? People grow olives and produce olive oil for many reasons. Most olive oil producers have other income, so don't think about mortgaging the farm. But if you're passionate about olives and olive oil, do some research and look at the scenario for your property. You may decide that money is not the biggest consideration, and that producing your own elixir of the gods is reward enough. Olives do, however, require some cold (below about 45 degrees F) for proper flower development. This fluctuates greatly with olive variety. Because of the chill requirement, olives will not produce in tropical and semi-tropical areas.

They also need moderate and fairly dry conditions during bloom in order to set fruit well. Since olives are wind pollinated, wet weather from April to June can interfere with proper pollen distribution. Extreme heat during flower formation can also result in poor fruit set.

Deep, highly fertile soils are not desirable for olives since they tend to produce excessively vigorous trees. The best production comes from trees of moderate vigor. As with climate, however, the ability of olives to tolerate lean soil conditions does not mean they are entirely invincible. The fastest way to kill an olive tree (short, perhaps, of setting it on fire) is to plant it in poorly drained soil. Olives hate wet feet--period. If you have drainage problems, plant something else. A common sight in olive orchards is a swath of dead trees corresponding precisely to a drainage swale.

Nutrient deficiencies in soil must be corrected and toxic levels avoided, but overall olives have modest fertility needs. Nitrogen and, to a lesser extent, potassium and boron, are the nutrients most commonly supplemented in California. Olives require 40 to 100 pounds of actual nitrogen per acre yearly, an amount that can be supplied with legume cover crops or composted manure. Olives tolerate quite a wide range of pH, from 5 to 8.5, with about 6.5 being considered optimum.

Though traditionally dry-farmed, olives that are irrigated will come into bearing much sooner (in eight to 10 years instead of 20 to 30). Careful irrigation will also help avoid alternate bearing and produce a better product. Although table olives are irrigated generously in California (fruit size increases with additional water), olive oil quality benefits from modest amounts of added water. Keep in mind that young trees will require more water to reach full production in the shortest time

possible.

Farming Olives
When selecting your cultivars, consider cold sensitivity, maturation speed, intended use (table, oil or dual purpose) and desired oil style. If you're in an area that is likely to experience colder temperatures or early frost, you should stay away from varieties known to be particularly tender or late to mature.

There are many varieties that make both excellent oil and table olives, so it's possible to have your oil and eat olives too. The issue of oil style is extremely personal and will require that you taste a lot of different oils and decide what you like; even then, the olive cultivar is only part of the equation (fruit maturity, irrigation and "terroir" are also factors).

What Makes an Olive Oil Extra Virgin?
Many olive oils in the market claim to be extra virgin, yet the price range is enormous. What's up with that?

In Europe and many other countries, "extra virgin" is a narrowly defined grade of olive oil. Standards developed by the International Olive Council (IOC) require it to be produced entirely by mechanical means (no solvents) under temperatures that will cause no alteration of the oil (less than 86 degrees F). It must have a maximum free-fatty-acid level of less than 0.8 percent (a measure of the soundness of the fruit) and a peroxide value of less than 20 meq (a measure of oxidation). It must be free from defects when evaluated by a trained sensory evaluation panel and possess at least some degree of fruitiness.

Unfortunately, the U.S. government does not enforce IOC standards for use of the term "extra virgin." As long as the product is made solely from olives, it can be labeled "extra virgin olive oil" in this country. A petition has been filed to adopt the IOC standards for "extra virgin" in the United States. In the meantime, the playing field is anything but level for the domestic producer of true extra-virgin olive oil who must compete with low-cost imports that could never to be sold as extra virgin in Europe. The maturity of an olive at harvest can be anything from completely green to completely black (all olives turn black eventually), depending on the style of oil desired. Greener fruit yields oil that is more bitter and pungent (peppery), and that has a grassy, herbaceous character. Completely ripe fruit produces oil that is mild and buttery. The entire spectrum of colors and flavors in between is available; most oils are a mixture of green and ripe flavors, and are made from fruit harvested as it is turning color.

Dry-farmed olive trees were planted far apart, anywhere from 30 to 60 feet. Virtually no orchards are being planted on such distant spacing anymore; the more modern, "high-density" spacing is now the norm. In high-density orchards, trees are planted eight to 20 feet apart and rows spaced 16 to 24 feet apart, the average being around nine feet between trees and 18 feet between rows. This system is suitable for any variety; olives can be harvested by hand or by using a trunk shaker.

The super-high-density (SHD) planting system has caught on in a big way in California because of economics. The highest cost in producing oil olives has always been the hand harvest (variable, but around $300 to $400/ton). SHD allows the fruit to be harvested with modified over-the-row grape harvesters (around $40/ton) and pruning becomes the highest cost. SHD spaces the trees four to five feet apart and rows 12 to 13 feet apart, with trees topped around nine feet and trained to a hedgerow. To date, only three varieties have been successfully grown in SHD orchards because of the low-vigor/early-yield requirement. SHD also provides a speedier return on investment. High-density spacing is expected to take eight to 10 years to reach full production; a SHD orchard can be expected to bear heavily in only three years.

High-density olives are usually pruned in an open center "vase" shape. The trees are allowed to grow unpruned for the first four years and then they are opened up in the center with the removal of a few good-sized branches. The objectives are to allow sunlight to penetrate the center of the tree and to lower the canopy to make harvesting easier. The best time to prune is in the springtime when the trees are in bloom.

Pests
All the significant pests of olives can be successfully managed with products that are approved for certified organic production. Considering the value that organic status can add to a product, certification is certainly worth considering. Olives are susceptible to verticillium wilt; the fungus penetrates the root system and blocks a plants water-conducting system. It usually enters through wounds in the roots. When in doubt about a particular site, have a laboratory soil analysis done.

The two most common diseases of olives are peacock spot and olive knot. Both can be controlled with by applying a

fixed-copper fungicide. The worst insect pest is the olive fruit fly. The fly lays an egg in the olive and the larva tunnels inside. The fruit is then worthless for table use and the damage tolerance for oil is around 10 percent. There are a number of effective controls available, such as setting traps and using sprays. Olives are also prey to various scale insects. These are usually minor pests, but they can cause cosmetic damage to table fruit and stress trees if severe.

Good weed management is critical when olives are young; competition from other plants while the trees are growing and filling out will slow their growth rate tremendously. After the first five to 10 years, the trees can tolerate a green cover crop as long as they are not being dry-farmed.

Harvest
The olive harvest usually starts in mid- to late-October and can continue into the new year. A large amount of harvest is still done by hand and relies on nets placed on the ground to catch fruit that has been pulled, raked, shaken or beaten off the trees. To assist hand harvest, devices such as pneumatic rakes and mini-shakers may be used.

Good fruit, harvested at the right time and processed promptly, makes good oil. The moment an olive leaves the tree, it begins to deteriorate. Fruit should be processed within 24 hours, sooner if possible. Olives that are left in bins or piles for too long begin to compost, heating up inside the pile and deteriorating quickly. This causes a very distinctive defect in the oil called fustiness.

During the past few years, the number of olive-oil mills has increased dramatically; if you're in the olive-growing regions of California, there's a good chance a mill not too far from you. A possible option for the isolated producer is one of the smaller mills on the market.

Olives to Olive Oil
Making olive oil is a simple process. The olives are washed and then ground to a paste, usually with a hammermill, but some mills still use stones. The paste is then stirred slowly in a warmed tank, a process called malaxation. This helps the droplets of oil combine to form bigger drops. The next step is to separate the oil from the solids and fruitwater. The traditional method used a stack of grass mats smeared with paste; the mats were squeezed to separate the liquid from the solids. The modern method uses a centrifugal decanter that spins the paste to separate solids, water and oil. A second centrifuge (a modified cream separator) removes the last of the wastewater and impurities from the oil.

The oil is allowed to settle before bottling and will often be bottled as it is released for sale because the quality of the oil is better preserved when it is stored in bulk. Oil isn't necessarily filtered before it is bottled. Olive oil is a perishable product; its enemies are heat, light, air and time. Store it in a cool place (refrigeration is not necessary) protected from light (dark glass is best for olive-oil bottles). The longevity of any olive oil will depend in large part on its polyphenol content. Polyphenols have antioxidant properties that make olive oil more stable. An earlier harvest oil will have a higher level of these compounds, so it will tend to keep longer. A late-harvest oil will be lower in polyphenols and subject to rancidity much sooner. You can figure that an unopened, well-stored, greener-style oil will keep for about two years; a late-harvest oil will last half that long. To get the most out of high-quality, extra-virgin olive oil, treat it as a condiment rather than subjecting it to high heat.

If you're looking for a way to get rich, olives are definitely not your best bet, but opportunities do exist and the market for olive oil is growing fast. Olives are easy to grow and require little in the way of inputs. They can be integrated into the landscape as ornamentals and they are a wonderful way to add diversity to your farm.

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