

Growing Avocados in Orange County

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Avocado is one of the most valuable types of produce sold. They are native to the highlands of southern Mexico and Guatemala where the temperature stays warm all year. However, enough varieties are available to ensure success nearly anywhere in Orange County. Avocado is the most difficult orchard crop grown locally because of its soil requirements.

Commercially the best locations are between 700 and 1500 feet altitude on a hill, with south or west exposure, and with excellent cold air drainage and soil drainage. These locations will have the fewest crop failures.

Avocado trees are bushy evergreen trees with large leaves that can potentially grow 30+ feet tall and nearly as wide but are usually maintained lower. Modern orchards are kept below 20 feet tall. The trees create ample shade and the ground beneath them is usually covered (and should be covered) with their dead leaves. Most produce small creamy green flowers in spring, and the resulting fruit ripens 6-18 months later. Although not essential, most local orchards plant 2 varieties for cross-pollination, (see "Pollination and Fruit Set") which can increase crop volume slightly.

There are **2 main races of Avocados**, Mexican and Guatemalan. Mexican avocados are a bit hardier to cold and the fruit is typically smaller with thin black skin and a stronger flavor. Guatemalan avocados are larger with thicker skin and more sensitive to frost. Many of the most recently introduced varieties are hybrids.

RACE	BLOOM TO FRUIT	FRUIT SHAPE/SIZE	FRUIT SKIN	FRUIT PULP	FRUIT SEED	LEAVES	HARDINESS
MEXICAN	Blooms earliest 6 months	Small, pear-shaped	Very thin, usually smooth	Highest oil content, spicy	Large, smooth surface	Medium color with anise scent	Cold-hardy, resistant to heat but doesn't do well with high soil salinity or a coastal environment
GUATEMALAN	Blooms late 12-18 months	Small to large, round	Thick, rough, leathery	High oil content, often nutty	Small, smooth surface	Redder leaves, no anise scent	Subtropical, does not survive in a tropical environment or one with hard frost. Most salt tolerant.

NOTE: Hybridization between these avocado races can occur whenever they are in close proximity.

* Fuerte cultivar is a natural Mexican/Guatemalan hybrid which produces green pear shaped fruit

* Hass cultivar is ¼ Mexican, ¾ Guatemalan hybrid which produces a rounder fruit shape which is black at maturity

Start with a Good Plant

Avocado trees grown for retail sales generally die or perform poorly. Trees grown in retail-friendly 5-gallon, 15-gallon, and 24-inch boxes are always grown in a soil that contains significant amounts of sawdust or finely ground bark. Although they may be healthy initially, the decomposing sawdust or bark eventually causes root problems. As the organic matter decomposes the permeability of this soil and the available oxygen for the root decreases. If the soil where the tree is planted is extremely permeable (sandy), performance may be satisfactory. If great care is taken, the soil of a retail tree can be removed by washing with water and the "bare root" tree can then be planted into half garden soil, half Gary's Top Pot with improved performance.

A far better result occurs if trees are acquired from a commercial orchard supplier. These trees are grown in bottomless plastic tubes filled with decomposed granite. Orchard trees are also available grafted to *clonal* rootstock with genetic resistance to root rot diseases. (Interestingly, clonal rootstock is usually grown in soil mixed with wood chips.)

Avocados are easy to grow from seeds (pits). Avocado seeds are zygotic, so seedling trees are normally similar to the fruit it came from, but not genetically identical (as similar as children are to their parents.) Seedling trees normally grow about 10 feet tall before flowering and fruiting, which may take 3-5 years. There seems to be better than a 50% chance that the fruit will be good to eat. The World-famous *Hass* variety was a seedling that refused to accept a graft that grew at the Hass orchard in Yorba Linda, California.

Prepare the Site

Avocados will grow in sun or shade; however, sun is required for maximum production. The most important factor is having soil with **excellent drainage**.

Excellent drainage can be determined by digging a hole about 18 inches wide and deep and filling it with water twice. If the water from the second filling disappears within 24 hours the drainage is adequate. Faster is better. Some advisors recommend 15 minutes to drain on the first fill! Clay soil can drain adequately if located at or near the top of a slope.

On poorly draining soil you can create a raised bed (minimum 18"), a French Drain, a dry well, or plant Citrus instead. One of the most recent recommendations is to dig a hole 1 foot deep and 8 feet across. Mix enough sand and/or pumice with the dirt so that you end up with a caldera-like mound that is 18-24 inches higher than the original soil surface. This mound is of adequate size and drainage to grow 1 or 2 trees.

Pot Sleeve into #5 Pot (leave in pot 4-6 months until tree is 3-4' tall)

- Pour 3-4" of Top Pot in bottom of pot, place tree in pot (seed should be at about rim level)
- Use box cutter to gently cut sleeve plastic from bottom to top then peel away from tree soil/roots
- Place root ball onto soil in container - we want the top of the seed to be level with the top of the container.
- Fill around root ball with Top Pot to within 1" of the rim of the container.
- Tamp soil and pack around sides of tree so soil doesn't move
- Fertilize with 1.3 oz Osmocote AND 1 oz another organic fertilizer with mycorrhizal fungus
- Water thoroughly
- Stake and loosely tie avocado stem in 2 to 3 places to hold the main stem straight up
- Place in part sun for several weeks - then full sun. Keep soil moist, possibly daily during hot weather.
- Paint stems with IV Organics or Latex paint if exposed to hot weather

Growing in Containers

Avocados can grow well in large pots, 5 to 20 gallons (depending on the size of the tree). Use our Top Pot soil for good drainage, stake, and fertilize with Osmocote AND another organic fertilizer with mycorrhizal fungus.

Always keep potted trees moist. This may require daily irrigation or even twice daily irrigation during the warmest weather. Wait 3-4 months before transplanting into ground or another pot.

Planting in the Ground

Dig a hole about 18 inches deep and wide. Place the plant sleeve containing the roots and soil (Gary's Best Acid Mix) vertically at the center of the hole so that the surface of the root ball matches the surface of the surrounding soil. Mix the soil that you removed from the hole with an equal part of our Gary's Best Acid Mix (pumice and peat moss). Place this soil around the root ball and fill to the surface. Create a dirt wall basin around the tree to channel water into the soil and root ball. Fill with water several times to moisten and settle the soil. Growers also recommend applying 40 pounds of gypsum to each newly planted tree!

Newly planted trees are normally staked and white-washed. The surface of the soil should be always mulched deeply, preferably with old avocado leaves that have dropped.

Whitewashing

Seedling Avocado trees grow with perfect symmetry, and the leaves adequately shade the tender green branches below. Grafted trees, compared to seed grown trees, have an asymmetrical growth habit that allows full sunlight to strike the stems. While mature leaves tolerate extreme heat, green stems can burn with exposure to sun at temperatures much above 90°F. Burnt stems turn yellow, brown or black. Severe burns can kill the branch beyond the burn area. Mild burns cause poor sap flow and reduced vigor. The best way to prevent sunburn is to paint any exposed stem with a whitewash. “IV Organics” is a brand of organic whitewash we've seen to be effective and preferable over non-organic alternatives like white latex paint and water applied at a 1-1 ratio. It not only prevents sunburn, but it can also deter some pests. This may need to be applied for several years until the trees canopy is quite full. Whitewashing may be required at any time a mature tree is pruned or when weather (frost) conditions cause excessive leaf drop.

Irrigation

Avocado trees require ample water. Most orchards are irrigated daily during warm weather with micro sprinklers. The soil moisture should be maintained at 12-18 inches of depth and at least half of the soil under the canopy should be irrigated. In coastal valleys of San Diego County, it has been found that a young tree 4 feet tall and wide uses about 1 gallon of water per day in summer. A mature tree 20 feet tall and wide uses about 40 gallons of water per day.

Pruning

Avocados do not require pruning to produce a good crop. The trees are generally skirted (cutting off branches that are too close to the ground). They are also topped when they get too tall to harvest. When old trees are cut down to 4 feet production resumes in 1-2 years. Some growers constantly prune to maintain trees at 12 feet in height. It has been determined that the ideal shape for production and harvest is a dome less than 15 feet tall. Ideally all the foliage is exposed to sunlight. **Pruning for size control should be done after harvest, varying for each variety.**

Pollination (type A & B) and fruit set

Avocado trees are essentially self-fertile (do not require the presence of a genetically different tree), however the crop can be enhanced. According to the University of California, the 2 factors most critical for successful fruit set are warm weather (80°F daytime high) and the presence of bees during the bloom period. If the pollen of a different Avocado variety was available, the crop increased by perhaps 10%. This may be critical to orchard success, but probably not noticed by home gardeners. Research is continuing.

Avocado trees bloom in 2 patterns (Type A & Type B). Type A varieties are female in the morning and male in the afternoon. Type B varieties are reversed. Usually there is some overlap during midday. A type A tree can acquire more pollen if it is blooming close to a type B tree, and vice versa. The trees should be within 25 feet of each other. Closer is better. Different varieties also bloom at different periods of the year. Varieties that bloom early typically flower from December to February. Mid-season is from March to May, and late season is from April to June. A few varieties bloom at other times and many old specimens bloom several times per year.

	DAY 1		DAY 2	
	MORNING	AFTERNOON	MORNING	AFTERNOON
Flower-type cultivar "A"	♀			♂
Flower-type cultivar "B"		♀	♂	

Harvesting

Avocados do not ripen on the tree. In Nature they drop and ripen on the ground. The fruit is picked hard and green during that variety's harvest season. Generally, any decent size fruit will ripen, but if picked too early it will have no flavor and sometimes a lot of strings in the flesh. Most varieties have a 4-month harvest period. It is recommended that fruit be cut from the tree with a tiny bit of stem attached to the fruit.

Root Stock

Clonal Rootstocks

Duke 7 - This rootstock is vigorous, with good frost tolerance. Its tolerance to *Phytophthora cinnamomi* is moderate but is more tolerant to *Phytophthora citricola* instead. Produce good fruit size early in the season. Tend to stay green in cool soils during winter when trees are more susceptible to chlorosis. Moreover, it induces a less alternate bearing than other rootstocks. It is not recommended for poor aerated soil, salinity problems or replanting.

Toro Canyon - This rootstock has a high tolerance to cold and root rot caused by *Phytophthora cinnamomi*. It is very tolerant to *Phytophthora* canker or collar rot caused by *Phytophthora citricola*. Its moderate canopy size is a very efficient volume of fruit production. It is more tolerant to salinity than other Mexican seedling rootstock.

Seedling Rootstocks

Zutano - This rootstock has high graft potential and supports high vigor. Fruit yields are high but variable due to a lack of genetic uniformity between each seed. It provides high tolerance to frost and variable tolerance to *Phytophthora* (root rot).

Varieties

Here is a list of the popular cultivars. Store stock may vary.

BACON (Mexican x Guatemalan) 10-18 oz., pear, medium sized fruit with smooth, yellow-green, thin skin and pale yellow-green flesh that stays green when ripe. A heavy producing, upright tree that's very frost tolerant. Good to very good quality with medium to large seed. Harvest January to March. Bloom type B

CARMEN HASS (sport of Hass, originated in Mexico) 6-14 oz., similar fruit to *Hass* but slightly smaller with an excellent flavor profile. Fruit that ripens at the same time as *Hass* are pear to oval shaped. Fruit that ripens at other times is oval. It is known to heavily defoliate. It is still being evaluated to determine if distinct bloom and harvest periods exist in California. It's believed that *Carmen* flowers and produces more regularly in a commercial orchard environment as compared to home orchards where consistency can be very irregular. Tree shape is rounded with a dense compact canopy. Typically fruits year 2-3. Bloom type A.

DON GILOGLY (Mexican origin) 11-14 oz., long pear shaped with green-black, medium smooth, delicate, skin that turns black when ripe. Excellent quality fruit, distinct, buttery flavor. Harvest spring-summer. Small, upright, considered a vigorous dwarf variety that blooms winter and spring with two harvests. Bloom type A

EDRANOL (Guatemalan) 9-18oz., is a vigorous growing variety that produces pear shaped fruits that are high in oil content and have an excellent nutty, buttery flavor. The trees tend to grow more slender, upright and are very disease resistant. This variety is highly recommended and adapted to coastal regions as the fruits can sunburn in hot interior areas. February - July harvest. Long hang time, tendency to alternate bear, heavily. Bloom Type B

ESTHER (Guatemalan) 11 oz Pear shaped with green, medium skin. Later fruiting variety that produces consistently heavy good crops of large, rounded fruit with a creamy pulp. Rarely alternate bears. Has good flavor and lasts longer after being picked. Genetics contain *Hass* and *Nabal*, best near the coast.

Tree is small and compact. Harvest August - December. Bloom type A.

ETTINGER (originated in Israel) 9-16., was introduced in the U.S. in 1954. Excellent quality bright green fruits have light yellow flesh that surround a large seed. The tree is vigorous and very prolific. Fruits ripen slightly before and with Fuerte in Riverside CA. Bloom type B

FUERTE (Guatemalan x Mexican) 9-16 oz. Pear-shaped fruit with slightly rough, green, thin, rough skin and creamy flesh, green near skin. Excellent quality with buttery flavor. Easy to peel. Produces heavily in alternate years. Tree has a large, spreading form. Harvest November-March. Harvests can be light, not reliable. Bloom type B.

GEM (Mostly Guatemalan, Hass descendant) 7-18 oz., pear-shaped fruit with rough, thick, black skin flecked with gold. Excellent quality, better than *Hass*. Easy to peel. Good production, less alternate than *Hass*, long hang time. Compact to medium upright tree. Daughter of Gwen. Developed to be hardier than Gwen by UC researcher Gray E. Martin. Harvest March-September. Bloom type A

GREEN GOLD (Mexican x Guatemalan) 12 oz. pear shaped green fruit with medium to thick skin. High oil content 20+%. Compact to medium sized, upright tree. Daughter of Sharwil, tendency to alternate bear, excellent flavor.

Adapted to cooler climates. Developed by the University of Hawaii. Harvest January - April. Bloom type A.

GWEN (Mexican x Guatemalan) 6-15 oz., semi-dwarf descendant of Hass developed to replace Hass. Rich buttery nutty flavor, oval, green medium. Tree is considered a smaller and excellent producer with excellent quality fruit. Tends to overproduce and break branches. Has had problems with defoliation during winter and is tolerant to cold, heat, wind or drought. Harvest April - September, Bloom type A.

HELLEN (Guatemalan) Tree is a vigorous grower with an upright and round shape. Harvest season June to September. Often hidden in foliage, fruit is 9 to 14oz (can be larger), pear shaped, with thick, leathery, green skin, peels easily. Bloom type B.

HASS (Mostly Guatemalan) 6-14 oz, pear-shaped to oval fruit with leathery, rough, thick black skin and cream-colored flesh. Excellent quality with medium seed. Easy to peel. Harvest April-October, some all year. Bloom type A mid-season. THE LEADING COMMERCIAL VARIETY.

HOLIDAY (Guatemalan) 18-30 oz., a semi-dwarf tree that produces excellent green, broad pear-shaped fruit in the fall and winter. This variety is characterized by its large fruit and distinctive weeping or sprawling habit. The tree is both highly productive and attractive, making it an excellent choice for backyard or container planting. Smallest and spreading of trees. Harvest July-Nov. Bloom, type A.

JAN BOYCE (Mexican x Guatemalan) 7-11 oz, oval shaped fruit with green, medium thin green skin. The flavor, texture and flesh color are of excellent quality. A bonus is that it has a small to very small seed. The tree has somewhat of a leggy growth habit. Considered by some to be a gourmet avocado. Harvest March-July, Bloom type A.

LAMB HASS (Mostly Guatemalan cross between Hass and Gwen) 10-16oz., like Hass with slightly thinner skin and larger fruit. Good to excellent quality with exceptional flavor and easy peeling qualities. Can develop strings in flesh some years. Heavy producer. Upright, compact habit. Harvest May-

November. Bloom type A mid-season.

MEXICOLA (Mexican) 4-6 oz, pear-shaped to round fruit noted for its shiny purple-black, thin, smooth skin. Excellent quality, frost hardy with strong nutty flavor. Large seed. Heavy producer. Small tree. Harvest August-October. Bloom type A.

NABAL (Guatemalan) 16-30 oz., nearly round fruit with thick, smooth, granular, deep green skin and yellow creamy flesh. Excellent quality with large seed. Easy to peel. Heavy producer that is strongly alternate bearing. Frost sensitive. Harvests June-September. Bloom type B.

PINKERTON (Mexican x Guatemalan) 9-18 oz. rounded to pear-shaped fruit with a long neck with medium-leathery green skin. Highly recommended due to its consistent production, excellent flavor and manageable tree size. Very small seed. Heavy production further south with warmer winter temperatures or on hills with better cold air drainage to prevent damage to flowers. Small to medium spreading tree. Harvest December-April. Bloom type-A

QUEEN (Guatemalan) 20-34 oz., noted for its very large fruits that can weigh up to 30 ounces. The large, purple-colored elongated pear-shaped fruits have excellent flavored flesh that contain a small seed. The tree is considered cold hardy, growing to be large and broad shaped. Harvest July - August. Bloom type B

REED (Guatemalan possible hybrid of Nabal) 12-18oz., very round, very large, thick-skinned, easy to peel, green avocados with a creamy smooth texture and excellent buttery-flavored flesh. Excellent to outstanding quality. Heavy producer resistant to salt burn yet cold tender. Expect fruit year 2. Upright narrow tree. Harvest July-October. Bloom type A

SHARWIL (Mexican x Guatemalan may be offspring of Fuerte) 8-16oz., Trees are medium growing, fruits are of high market quality due to its exceptional flavor, high oil content and small seed. The skin is green when ripe, is bumpy and of medium thickness, and peels easily. Currently marketed as a gourmet avocado due to its many desirable characteristics. A small to medium sized tree. Harvest March-November or longer. Bloom type B

SIR PRIZE (Guatemalan cross often referred to as a grandchild of Hass) 12-16 oz., excellent quality avocado that resembles Hass with a small seed. It blooms earlier and matures 6 to 8 weeks earlier than Hass. The fruits have a distinctive ridge along one side which becomes less noticeable when the fruit ripens. The skin texture is not truly pebbled like Hass but does have tiny islands of varying yellowish shades giving the illusion of 'Hass'-like pebbles. The flesh has a buttery, high-oil texture with a nutty sweet flavor. The compact tree has an upright growth habit. This avocado variety is gaining popularity as a commercial variety. Harvest March-July. Bloom type B

STEWART (Mexicola Type) 6-12 oz, cold hardy more compact version of its parent Mexicola. The pear shaped fruits are shiny black with a thin skin. The firm melting flesh is clear, bright, light-yellow shading to green toward the skin and is of excellent quality. The tree is vigorous, large, upright and produces good crops. Harvest Oct-January. It is listed as an A-Type avocado but has shown B-Type characteristics.