Planting an Avocado Tree or Two

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Practices in planting Avocados have changed dramatically over the decades. Much has been learned in both field studies and biological research. The new commercial practice today is to plant on a mound built over a shallow hole. The mound is buried in mulch with ample water supplied almost daily on top, with frequent applications of a lower phosphorus fertilizer. It is also common to find two or more trees in a hole – one type A and the other type B to boost overall fruit production.

So, you want to grow Avocados at your home? Take advantages of the latest recommendations from Avocado researchers and improve your chances of long-term success.

Tree selection. The most important distinction among Avocado varieties is their bloom type: A and B. One is female blossom in the morning, and male in the afternoon – the other is the opposite. After the sex change, the blossom is often viable for another day. It has been repeatedly observed that groves with both types of trees in close proximity have significantly higher yields. Conversely, some plantings with only one bloom type *never* produce. Therefore, having an A and B tree in close proximity at home is highly recommended.

Another factor in tree selection is size. A "standard" tree will want to grow 25-40 feet high and most of these just as wide – although the "Reed" variety is well-known for its narrow, upright form. Avocados which have been grafted onto rot-resistant rootstocks have been found to limit their height to the 20-25 foot range. There are also small, "dwarfish" varieties including "Gem", "Gwen", "Holiday", and "Sharwil". These will grow from 10' to 15' high. The "Don Gillogly" variety has been advertised as dwarf, but trials at Durhling's Nursery in De Luz have proven otherwise.

The taste of the "Hass" Avocado is well known to consumers, especially since distributors prefer the "Hass" variety for uniformity of size and durability in the marketplace. Generally, taste is a function of oil content and texture, the higher % oil being more desirable. The "Hass" Avocado is roughly 72% flesh by weight with 18% oil content. All varieties listed below are over 70% flesh by weight and have oil content of 18% or higher.

Well, we're not quite done yet. Avocado trees generally blossom in January through March, but there are some significant differences between cultivars. There are 3 main strains of Avocados, with lots of inter-strain hybrids: Mexican, Guatemalan, and West Indian. The latter two flower mid-season – and sometimes all season, while the pure Mexican strains flower early. Obviously it is not much help to have A and B trees that flower in different months.

Finally, Avocado trees can be very susceptible to root rot. If you live in an area with less than perfect soil, then paying the extra money for a cultivar grafted on rot-resistant rootstock is well worth the investment.

Select Avocados for Home Orchards				
Tree Size	*Blooms*	*Bloom Type*	*Variety*	*Ripens*
small	mid	A	Gem	summer
		A	Gwen	summer
		A	Holiday	fall
		B	Sharwil	spring
large	early	A (far inland)	Stewart	fall
		B	Sir Prize	summer
	mid	A	Ardith	summer
		A	Hass	summer
		A	Lamb Hass	fall
		A	Pinkerton	winter
		A	Reed	fall
		B	Hellen	summer
		B	Nimlioh	fall
		B (coastal influence)	Stewart	fall

Planting. The basic idea is to excavate an 8-foot diameter hole to a depth of 1 foot, and then build in and above this hole a spherical shaped mound that is eventually 1.5 to 2 feet above the original ground level. The trees (type A and B) are planted off-center but near the top of the mound. The entire mound is covered with about 4 inches of orchard mulch.

Dig the hole, keeping all the native soil for later use. Fill the hole with water (quickly, using a high-pressure line) two times, the second time soon after the 1st drains. If the water does not drain away both times within 10-15 minutes each, then there is a drainage problem. Construct one to three "french drains" (pipeless, with ½ to ¾ inch gravel and pumice on the bottom) and test again in 2-3 days.

Remove all cobblestones from the excavated dirt but leave any rocks smaller than a tennis ball. The volume of soil required to refill the hole and build the mound will be

$$\pi \cdot (4\ \text{ft})^2 \cdot (1\ \text{ft}) + \tfrac{1}{6} \cdot \pi \cdot (1.5\ \text{ft}) \cdot \left[3 \cdot (4\ \text{ft})^2 + (1.5\ \text{ft})^2\right]$$

or about

$3\frac{1}{3}$ cubic yards.

If your hole and hence your native soil did not pass the "drainage" (percolation) test above, then half of the soil volume should come from an additive with the following properties:

- good drainage
- low in phosphorus
- little or no peat moss

Note that most commercial compost products are high in phosphorus. A good choice is bulk potting soil, which is roughly

- $\frac{1}{3}$ washed sand or small grain inorganics
- $\frac{1}{3}$ 3/8″ washed pumice or perlite
- $\frac{1}{3}$ small grain forest humus or ground coir

If not already present, also mix in 1 bag (1–2 cu.ft.) of humus with worm castings. If your hole *did* pass the percolation test, then make up the difference with more of your native soil, and use the additive mix above if necessary.

Keep in mind that there are 27 cubic feet in 1 cubic yard. Buying a yard's worth of soil by the bag is an expensive proposition. Instead, contact a bulk soil supplier or see the "pro" desk at a large nursery or building materials store.

When you have completed filling your excavated hole, place your potted trees (or better: empty pots the same size) where the trees will be planted. A good choice is 1.5 each side of the center, with the trees positioned east and west of each other. Now build your mound around them. When all of the soil is in place, pull out the pots. Sprinkle a small quantity of food at the bottom of the resulting holes, either:

- 1 Tbsp. citrus fertilizer, such as Gro-Power 8-6-8 Citrus & Avocado Food

or

- 1 cup of a low-phosphorus composted manure, such as that from horse or sheep.

Bury the food in a few inches of soil, as a present to growing roots and to bring the soil level of the planted tree up to the soil level of the mound.

Cover the mound with 4 inches of orchard mulch. This will require

$$\pi \cdot (4\ \text{ft})^2 \cdot \left(\tfrac{1}{3}\ \text{ft}\right) \cong 17\ \text{ft}^3 \cong \frac{2}{3}\ \text{yd}^3$$

of material. Be careful not to encroach on the tree trunk. Important: top mulch is the key component in planting an Avocado. The mulch will provide a home to bacteria which in turn will dramatically reduce the risk of root rot. Check and restock the mulch as necessary on a yearly basis. Soak down the mulch with water to prime it with moisture for subsequent irrigations.

First-year fruits. Remove any fruits that form to the size of a grape or larger in the first year – or that are already present on the potted tree. The amount of energy required to bring a fruit to maturity is about equivalent to 4 feet of branch growth. Allow the tree to go through its fertility cycle, but remove any first year fruits in favor of branch production.

Feeding. Avocados benefit from monthly feedings. They are sensitive to salts, alkalinity in particular, and tolerate only a limited amount of phosphorus. In San Diego county, the ground and municipal water supply are slightly alkaline. Therefore your fertilizer should have a mild acid component that the water will always interact with. Fertilizers that contain humus or humic acids – a group of weak carbonic acids, will do just that.

If you are watering with soaker hose and feeding with a granular, simply pour the fertilizer directly on the soaker hose. Liquid fertilizers that are applied through an in-line feeding system (a *fertigator*) can be both labor-saving and very effective at treating water.

In terms of N-P-K (Nitrogen, Phosphorus, Potassium) the Avocado needs significant amounts of Nitrogen, limited amounts of Phosphorus, and enough Potassium to ward off disease and decay. In addition, the Avocado requires a host of micronutrients, including magnesium, sulphur, iron, manganese, and zinc. In choosing a fertilizer, it should be highest in Nitrogen content, have equal or less quantities of Potassium, and still less Phosphorus.

The following sources meet these guidelines, and there are undoubtedly more:

- Dr. Earth 6-4-6 Organic #10 Fertilizer
- Dyna-Gro 9-3-6 Foliage Pro Liquid
- GroPower 8-6-8 Avocado & Citrus Food
- Composted Horse Manure, ~ 0.7-0.3-0.6.

Composted sheep manure (.7-.3-.9) can also be used, but nitrogen supplements are needed to balance the excess potassium.

A small Avocado straight out of a 5-gallon pot needs about ½ pound of nitrogen per year. Older trees, and trees from larger pots, need 1 pound of nitrogen per year. Trees with canopies exceeding 10 feet wide desire 1.5 pounds or more of nitrogen per year. The "N" in N-P-K is % available nitrogen by weight. Using a little proportional arithmetic, the following feeding schedules can be calculated:

Monthly Feeding for one Avocado Tree

example product (choose one)	5-gal. tree	4'×4' canopy	15'×15' canopy
Dr. Earth 6-4-6	$1\frac{1}{3}$ cup	$2\frac{2}{3}$ cup	4 cups
Dyna-Gro 9-3-6 (liquid)	1.5 oz.	3 oz.	4.5 oz.
GroPower 8-6-8	1 cup	2 cups	3 cups
Composted Horse Manure	1 gal.	$2\frac{1}{4}$ gal.	$4\frac{1}{2}$ gal.

Watering. Install your irrigation with either flexible irrigation hose or an array of sprinkler heads.

For flexible hose (e.g., Fiskar 5/8″ soaker), lay it out in a spiral starting about 1 foot from the base of the trees and expanding outward at 1 foot intervals. Optionally, insert 2 to 4 gallon/hour pressure-compensating drippers in the hose at 16 inch intervals. The hose is essentially an *Archimedes' Spiral* (polar equation $r = a\theta$) with $r = 4$ feet after 4 complete rotations, or $\theta = 8\pi$. The length of this spiral will be

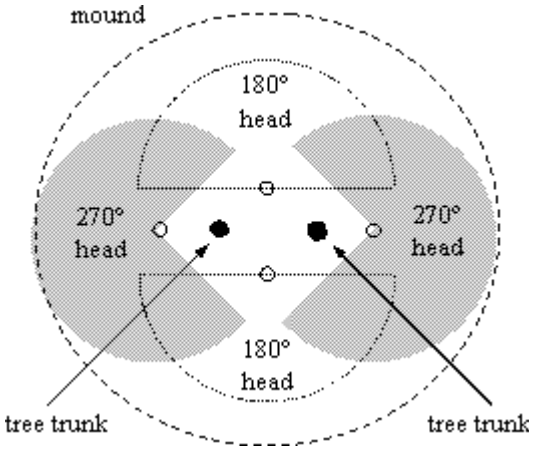
$$\frac{1}{2}a\left[\theta\sqrt{1+\theta^2}+\ln\left(\theta+\sqrt{1+\theta^2}\right)\right]$$

$\cong 50$ feet

optionally using about

38 pressure-compensating drippers.

For sprinkler heads, install two 270° ~3 gal/min heads – one at the east and the other at the west side of the mound, so that the "notch" points at the tree trunks; i.e., no spray will hit the trunks. Also install two 180° heads – one at the north side and the other on the south side of the mound, again pointing away from the trees. Adjust the water pressure so that the spray area matches the tree canopy.



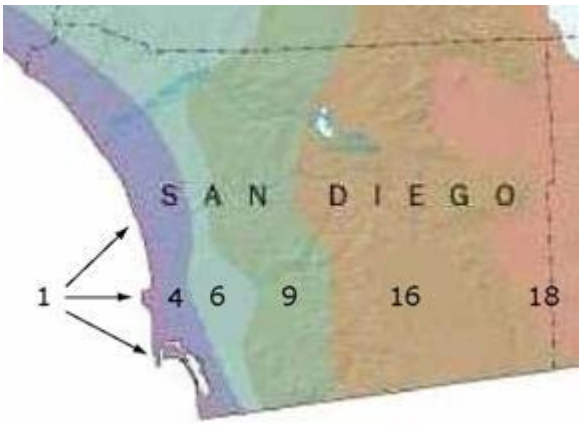
The actual amount of water to use depends on (a) the climate you live in and (b) the tree size – or really the ground area circumscribed by the tree canopy, and (c) several other factors discussed in the references listed at the end of this article.

A key factor in irrigation analysis is the local ETo (evapotransporation) rate. As shown in the map below, there are 6 major ETo zones in San Diego county:

1. Heavy fog belts
4. Coastal hills and mesas

6. Intra-coastal ridges (e.g., Scripps Ranch)
9. Interior valleys with semi-arid transitions
16. Mountainous regions
18. Eastern low-desert areas

ETo Zone Map for San Diego County



The CIMIS (California Irrigation Management Information System) irrigation model for Avocados is:

$$G = \frac{ETo \cdot Kc \cdot C \cdot 0.623}{\varepsilon}$$

where:

G = gallons of water

ETo = evapotranspiration rate

Kc = crop coefficient

C = tree canopy size, in sq.ft.

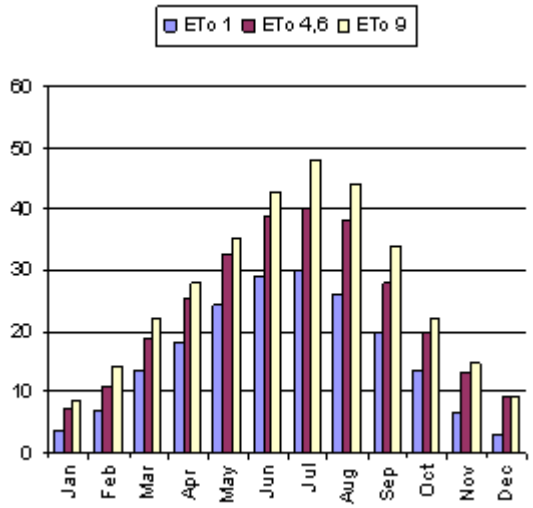
ε = irrigation efficiency

G, the gallons of water is computed in months since ETo and Kc are also monthly figures. The tree canopy size for a new tree out of a 5 or 12 gallon pot can be considered 4×4, or 16 sq.ft. A 5-7 year old tree with a 20 foot canopy will have *C* = 400 sq.ft. The irrigation efficiency ε can be considered equal to 1 *if* you are using emitters with a guaranteed flow rate.

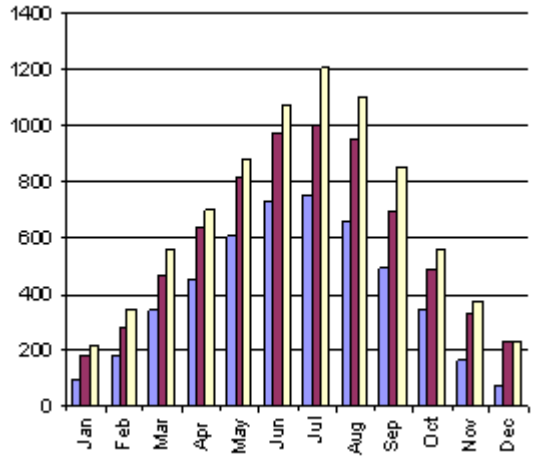
Putting this altogether, one can obtain estimates for irrigating in your specific zone on a monthly basis. The charts below show estimated watering requirements for two tree sizes in Zones 1, 4, 6, and 9. However, zones 4 and 6 are so close in calculated value, they have been averaged into a single column.

Although these tables show monthly irrigation amounts, water is usually applied 2 to 3 times per week – the exception being during wet weather. The CIMIS formulation above does not account for precipitation. A rule of thumb is that irrigation should be delayed about one week after each storm of ¼″ or more of rain.

Gallons / mo. for a young tree, 4'×4' canopy



Gallons / mo. for mature tree, 20'×20' canopy



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