

Dr. Ben Faber
University of California, Cooperative Extension
Ventura, CA

Organic Avocado Production

In 2002, there were 2,175 acres of organic avocados in California and by 2007 (the most recent data) there were 2,929 acres with a production valued at \$15 million (CDFA, 2003, State Organic Crop and Acreage Report, [http://www.cdfa.ca.gov/is/i & c/organic.html](http://www.cdfa.ca.gov/is/i%20&%20c/organic.html)). The bulk of this acreage was in San Diego and Ventura Counties, but there has been increasing acreage in Santa Barbara County, as well.

In the *2007-08 Avocado Society Yearbook* we talked about the certification process. To recap, there are a number of organizations in California that are registered by the USDA National Organic Program (NOP) as organic certifiers. These certifiers differ in cost, name recognition, and ability to provide additional organic certifications (i.e. certifications accepted by other countries) beyond NOP standards. They also can vary in their interpretation of some NOP standards. For example, the NOP states that farms must have defined buffer zones to protect an organic crop from off-site pesticide applications. The size and type of buffer necessary is decided by the individual certifier. Certifiers do not have authority to make standards stricter than specified by the NOP. A grower may be certified by more than one certifier in order to meet special marketing requirements.

Conventional orchards converting to organic must go through a three-year transitional period. During this time the fruit may not be sold as organic, although some handlers may be able to give the product some premium by labeling the fruit as “transitional”. Organic and transitional fruit can also be sold as conventional.

Costs differ between certifiers but usually a one-time certification fee is assessed, followed by yearly renewal fees (often based on gross farm income) and yearly inspections. Inspection costs tend to increase with greater farm size and complexity.

During the inspection process, the inspector will not only look at the orchard, but will also examine farm records. Organic growers need to keep meticulous records of all farm operations, material applications and business transactions. These records need to be kept for at least 5 years.

Avocado is probably the best crop choice for going organic, because of the good biological control found in most of the groves and the low fertilizer demand. However, it can be difficult to convert a 30 year old conventional orchard to organic if it has root rot. But on the other hand, with the leaf mulch and shading, there is much less of a weed problem, and the natural mulch can be a significant source of nutrients for the trees.

If you do have the option of starting from scratch, you want to look for those site conditions that a conventional grower would look for as well. Good air drainage (but not so much that it knocks the fruit off), good quality/supply/cost of water, and good soil drainage. If no adequate organic nursery stock is available (at this time there are no organic trees available in California), conventionally-grown trees can be planted into an organic orchard without losing organic status, but fruit from these trees may not be sold as organic for one year. The key to tree selection for the organic grower is one that has a clonal rootstock resistant to root rot. Organic growers can not use phosphonates which have been so helpful to growers with root rot problems. The main defense the organic growers has against root rot, other than proper irrigation management, is going to be the rootstock.

We are seeing more and more high-density groves, and an organic grower may want to plant trees with a slightly tighter spacing to offset slower growth typical of organic orchards. This will result

in earlier yields and earlier shading of the orchard floor, with a corresponding decrease in weed competition.

Do not apply nitrogen-containing fertilizers in the hole with the new tree at planting. Even organic forms of nitrogen can burn roots.

Weed control is crucial after planting in order to establish a successful orchard. Prior to planting, growers should control perennial weeds such as Field Bindweed (*Convolvulus arvensis*), Johnsongrass (*Sorghum halepense*) and Bermudagrass (*Cynodon dactylon*) which are difficult to control organically. Mulches, especially woven plastic cloth, can be applied around new trees to provide weed control until the trees are large enough to shade out nearby weeds. Otherwise, growers will have to hand weed or hoe around trees for several years.

Organic yardwaste mulches are also used to great effect in Southern California, suppressing weeds, aiding in erosion control, reducing evaporative loss, and aiding in root rot control. Municipal mulches are often delivered very cheaply (the cost is in the spreading), but it is also not uncommon to see a crop of pine, eucalyptus, palm or tomatoes to show up not longer after a mulch has been spread. It is usually fairly easy to remove these when they are young, and then the woody mulch will continue to further suppress weeds. Mulches can also cool an orchard, raising frost hazard, be a fire fuel, and keep soils too wet in high rainfall years. They should not be allowed to accumulate around the tree trunk.

Mulches can also be a significant source of plant nutrients. Organic growers of other crops typically use a combination of foliar sprays (fish and plant extracts, growth stimulators, minerals), compost, and cover crops. The nature of the avocado leaf does not lend itself to foliar uptake, so any materials need to be applied by hand or fertigated.

Growers tend to use low analysis fertilizers because that is what is available organically. Compost, due to its high trucking cost is used only if it is produced locally. Compost has been shown to improve soil structure, water penetration, and water-holding capacity, as well as providing most or all nutrients needed for plant growth. Some of the more concentrated sources of nutrients available to organic growers are shown below. Often these materials do not have a fixed

percentage of nutrients and can vary with the source and how long it has been stored.

Material	N	P₂O₅	K₂O
Alfalfa Meal	3	1	2
Blood Meal	12	1.5	0.6
Bone Meal (steamed)	0.7-4.0	11.0-34.0	0
Compost (without manure)	1	1	1
Chicken Manure (composted)	3	3	3
Cottonseed Meal (dry)	6	2.5	1.7
Feather Meal	11.0-15.0	0	0
Fish Meal	10	4	0
Fish Emulsion	5	2	2
Grape Pomace	3	0	0
Kelp	0.9	0.5	1.0-4.0
Soluble Soy Bean Meal	7	0	0

Compost containing only plant material can be applied at any time. Although manures are allowed, especially composted one, food safety issues mean there must be strict guidelines on their use. Fresh manure can only be applied no less than 90 days prior to harvest, and no less than 120 days prior to harvest if the crop comes in contact with the ground.

In a young orchard, winter, annual leguminous cover crops can add nitrogen to the orchard as well as some organic matter, but do not add other plant nutrients. They grow with winter rains and are mowed down when they start to flower, and therefore don't compete with the trees for water. Typical leguminous cover crops include bell beans, vetch, and clovers. Avocado growers tend to avoid vetch as it climbs into trees or snags ladders during harvest. These cover crops are often reported as producing large amounts of nitrogen (about 100

to 200 pounds of nitrogen per acre), but these figures are typical of crops planted in open fields. Cover crops in orchards will produce much less nitrogen; the grower must take into account unplanted areas (under trees) and light competition from the trees. Avocado growers also often leave a cover crop in the ground for less time than normal to mitigate risk of frost damage.

Non-leguminous cover crops, such as small grains, do not add nitrogen but typically add more organic matter than legumes. They can be used to prevent loss of nitrogen during the winter which can be made available later in the growing season. They are also often used for logistic reasons; better winter access, weed and dust control, or to provide food and/or habitat for beneficial insects. Although release of nitrogen is increased by plowing under cover crops, few growers use tillage. Disturbing the soil can cause dust, which interferes with biological control, reduce orchard access during the rainy season, and will prune numerous avocado roots. Tilled soil also provides less cold protection in the winter than untilled soil.

Use of sodium nitrate is currently limited to 20% of the crop's total nitrogen requirement, and is usually not allowed for international certification. The high sodium levels can cause poor soil structure. However, many farmers prefer to use sodium nitrate since it is similar to conventional fertilizers, has a higher nitrogen content and is more soluble in water than many organic fertilizers.

Proper nutrition resulting in a healthy canopy with a high leaf count is important for using oil for pest control. Trees with many leaves will tolerate leaf loss from phytotoxicity better than a tree with a thinner canopy.

Do not forget to account for the nitrogen contribution from irrigation water. Many wells in older farming areas can make a considerable contribution to the fertility needs of trees. Some well waters can meet the entire nitrogen needs of an avocado tree.

Be sure that any product used in your orchard is allowed by the National Organic Program. A product with an Organic Materials Review Institute (OMRI, www.omri.org) label is safe to use. If the product does not have an OMRI label and you do not know all the ingredients (including inert ingredients), get written permission from your certifier prior to application. This is true for organic fertilizers and pesticides. Another website with materials registered for

organic use is the Washington State Department of Agriculture (agr.wa.gov).

As for other practices, such as pruning, irrigation, harvest and frost control, organic production is not much different from conventional production. Growers that use oil for perseia mite and spinosad for avocado thrips should prune trees so that good spray coverage is attained. Organic orchards may take more water if cover crops are used, but erosion control, water penetration and retention is generally improved with increased organic matter during the early life of the orchard.

Ethanol, isopropanol, calcium hypochlorite, chlorine dioxide, and sodium hypochlorite can be used for cleaning the irrigation system. Residual chlorine levels in the waste water should not exceed the maximum residual disinfectant limit of 4 ppm under the Safe Drinking Water Act. Higher levels are permissible at the beginning of the cleaning process as long as they can be diluted afterwards. This also holds true for sanitation of equipment such as pruning sheers.

Weeds are commonly cited as the main problem for organic farmers. This is true in young avocado orchards, but with the thick leaf layer in mature orchards, this is much less of a problem. Canopies should be kept low to the ground, especially on slopes to make sure wind does not blow the mulch away. Most growers use mowing or weed whips as the primary control for weeds. Growers also use mulches and cover crops as part of their control method. Weeder geese can also be used for weed control. Growers will need to provide water, supplemental feed, shade in new orchards, and protection from predators. Young geese less than a year old are typically restrained by a 30" high fence although a higher, preferably electrified, fence will be needed for predators. Older geese are less active and need higher fencing, but also are more likely to eat Johnsongrass rhizomes. More on organic weed control practices can be found at www.sarep.ucdavis.edu/bifs/organicweedmanagement.

Growers reported increased rodent problems with weeds, followed by increased coyote problems. The weeds also increase logistical problems during harvest and irrigation, and could increase the chance of fires or frost damage within the orchard. Despite these problems growers also found benefits with weed covers. The

resident vegetation often contains legumes that will fix nitrogen, provide habitat for beneficial insects, create mulch to provide some weed control, hold nitrogen that might otherwise leave the orchard when the trees are not active and release it later, can cool the orchard in summer, improve access during winter, and control dust that may interfere with biological control. In healthy mature orchards, weeds never become a huge problem because of the dense evergreen canopy and leaf litter.

As for pests and diseases, the main problem is the inability to use phosphonates for controlling root rot and crown rot. But inherently, these are irrigation problems. Properly irrigated trees with good drainage and dry trunks do not get these diseases. Maintaining a high level of organic matter by maintaining a natural or introduced mulch

Further reading and resources

Klonsky, K. and L. Tourte. 2002. Statistical Review of California's Organic Agriculture: 1995-1998. Agricultural Issues Center, University of California. Davis, California.
(Available at <http://aic.ucdavis.edu/research1/organic.html>)

Klonsky, K. and K. Richter. 2005. A Statistical Picture of California's Organic Agriculture: 1998-2003. Agricultural Issues Center. (Available at
<http://aic.ucdavis.edu/research1/organic.html>)

USDA National Organic Program
www.ams.usda.gov/nop/indexNet.htm

Organic Farming Compliance Online Handbook
<http://www.sarep.ucdavis.edu/organic/complianceguide/>

California Organic Program (Producers)
<http://www.cdfa.ca.gov/is/fveqc/organic.htm>

California Organic Program (Processors)
<http://www.dhs.ca.gov/fdb/HTML/Food/organreq.htm>

Organic Materials Review Institute, <http://www.omri.org/>

ATTRA Organic Information, <http://attra.ncat.org/organic.html>

OrganicAgInfo (Scientific Congress on Organic Agricultural Research)

<http://www.organicaginfo.org/>