

Growing Apricots in California: An Overview

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California produces more than 95 percent the nation's commercially grown apricots. The only other important apricot producing state is Washington with a small fresh market industry. Other countries that produce a significant amount of apricots are Turkey, Iran, Pakistan, Uzbekistan, Italy, China, Chile, Argentina and South Africa. Apricots in California are marketed fresh, dried, frozen for the manufacturing sector, canned, and as processed product in jams, pie filling, baby food, and many other products.

PLANNING THE ORCHARD

Potential for Profit

The apricot industry has undergone significant changes over the past 30 years. Drying and canning have declined significantly as markets. This is due mostly to cheaper imports, even though they are of lower quality. Overall, acreage has declined. Modest growth has been in the specialty fresh markets. It is anticipated that plantings will continue in various regions around the state - especially if they are close to a fresh market. Apricots have always been ideal for "farmers markets" and roadside stands.

During initial development, an orchard's yield potential is directly related to how quickly the trees fill the space allocated. At maturity though, yield potential for high density orchards is similar to that for a conventional system. High density orchards produce higher yields sooner, but initial development costs are higher because of having more trees per acre. Most apricots begin fruiting their second or third year but substantial bearing does not begin till the fourth or fifth years. Conventional orchards will have their first commercial harvest during the third or

fourth year. The trend is to develop shorter orchards that do not require ladders for pruning, thinning and harvesting. Pricing usually favors size, maturity and freedom from defects.

Processing apricots and apricots for drying can range from 2.0 to 15.0 tons per acre depending upon the condition of the orchard, weather and management skill with an average of about 12 ton. The average processing price per ton for 2006 thru 2010 was \$366/ton. In 2011 the grower price for all processing uses was \$390/ton.

Production Costs

UC cost studies for most crops grown in the state can be found at coststudies.ucdavis.edu and can be printed out for free. These studies should be adapted to fit your particular situation. The greatest production costs for apricots are for pruning, thinning, pest management, and harvesting. The most expensive input is hand labor. Any opportunities for mechanization can reduce this input. Unfortunately, as of this writing in 2011, there are no current cost studies on apricots.

Climate

Most apricots require adequate winter chilling (approximately 700 to 1000 hours at or below 45°F) for normal flowering and good fruit set. There are several varieties that bear reliably with considerably fewer hours. Consult your local Cooperative Extension office for varieties that are suitable for your climatic region. Apricots are a Mediterranean crop and thus require warm, dry growing seasons. Any county with warm, dry springs and summers and the availability of sufficient water should be able to produce apricots. Historically apricots have been grown throughout the Central Valley and in the inland valleys such as the Santa Clara. Apricots bloom early – February into early March. Frost at bloom and during early fruit development can significantly reduce the crop set. Rain at bloom time and near harvest can cause damage from diseases. Very hot days during fruit development can cause a disorder called “pit burn” in some varieties or may cause pre-mature ripening or softening. Wet conditions during the growing season can cause a variety of diseases on the leaves and or fruit.

Suitable Soils

Apricots will produce larger crops and achieve better fruit size on deep, well-drained soils. It is possible to grow apricots on shallow or marginal soils but yield and fruit size will be difficult to obtain. Loamy-sand, sandy-loam, loam and clay loam soils have been successfully used in many areas. It is more difficult to manage soil moisture in clay and clay-loam soils. Bacterial canker disease can be problematic in sand and loamy-sands, or old gravelly creek beds. USDA soil surveys are available for most agricultural areas in California and are available on-line at websoilsurvey.nrcs.usda.gov or from your local NRCS office. Although these surveys do provide much useful information, they may not show sufficient detail in all cases. Use a backhoe to dig several holes on site in all areas where differences in soil type seem likely. Growers, who are not familiar with soil evaluation, can contact the local Cooperative Extension Farm Advisor or NRCS for assistance.

Look for anything that might restrict water movement and root growth, such as clay pans, hardpans, silt pans, stratification and high water table. Apricots do not tolerate high levels of salts or boron. Soil chemical analysis gives clues to problems with pH, salinity, and toxicity from boron, sodium or chloride. Correction of soil problems before planting is more effective and less expensive than trying to correct problems after the orchard is established. A thorough soil investigation will help determine future management practices and rootstock choice. A soil sample should be taken from various depths and locations. Usually the analysis will include pH, salinity, exchangeable sodium percentage, and toxicity from boron, sodium or chloride. The lab that performs the analysis can give additional instructions on how to collect and handle the samples.

Sandy soils may have high populations of nematodes if the previous crop is a host. High numbers of nematodes can stunt trees and reduce production. A spring or fall soil sample that contains many small roots can be sent to a lab for analysis. Contact that lab for instruction on how to take and handle the sample for best results.

ESTABLISHING THE ORCHARD

Before planting, it is important to plan for and, level the land to promote good water distribution, and deep till, rip, or backhoe to destroy or mix impervious layers in the soil profile. Some sites will need to be fumigated based on nematode analysis and orchard history. Irrigation system infrastructure often needs to be installed prior to planting the trees. Nurseries need several months lead time to produce the variety and rootstock combination desired. Only purchase trees from reputable in-state nurseries.

There is a wide range of tree and row spacings in use today. The general trend is towards higher densities and shorter trees that do not require ladders for pruning, thinning and harvesting. Common spacings in conventional orchards are 20X20 feet or 22X22. Some newer, higher density orchards have 18 foot row spacings and 14 to 16 feet between trees. Row spacing is constrained by the equipment used – especially when mechanically harvested, which requires wide row spacing. New equipment designs are being introduced that are able to work in the new high density orchards.

Irrigation

Stone fruit are not tolerant to high salt levels or toxic elements such as boron, chloride and sodium in the irrigation water. Besides investigating water availability, water quality must also be determined prior to establishing the orchard. Analyze for Sodium Adsorption Ratio, chloride, boron, total salts, pH carbonates and bicarbonates.

All stone fruit orchards require a substantial amount of high quality water for top production and fruit size. A mature orchard with a cover crop growing in between the rows can consume up to 40 acre-inches of water per season in the Central Valley. Peak water use in midsummer is about 0.3 inch per day. With a safety factor included for exceptionally hot, windy weather and the potential for interrupted water supplies, the system should be designed to deliver at least 0.5 inch per day. In the San Benito/Santa Clara region, apricots will use about 37 acre-inches per year, including rainfall – typically 24 inches applied in addition. Approximately 13 inches of rainfall.

The type of irrigation system used is not as important as how well it is designed and managed. The system must distribute water uniformly to each tree. The choice of system depends on availability and cost of water, type and depth of soil, amount of land leveling needed, and any special management problems that may apply.

A large number of recently developed stone fruit orchards use two drip hoses per row with in-line drippers that are sturdy enough to tolerate being walked on by laborers. Drip irrigation has the advantage that it can also be used for delivering fertilizers to the trees. Planting trees on a berm (raised area of soil in the tree row) and flooding the middles is another common method which involves a lower initial cost and is cheaper to operate and maintain than drip. Sprinklers of any type are seldom used in the Central Valley but are sometimes used in the Central Coast areas. Low-volume micro-sprinklers and micro-jets may increase humidity in high density orchards that can lead to disease problems. These sprinklers can also be poorly suited to the large amount of foot traffic around trees during pruning, thinning, and harvesting. Hand-moved sprinklers are labor intensive.

Varieties

All apricot varieties are the genus and species *Prunus armeniaca*. In most varieties, the flowers are self-fertile and do not need pollinizer varieties like almonds do, nor do they need introduced bees as pollinators.

Varieties commonly used for processing: In 2010, Patterson accounted for 82 percent of the volume processed, Blenheim 4 percent, and other varieties 14 percent. Most of those other varieties were from the early season fresh market. Westley, Bonnie, Tri-gem and Tilton are varieties that have been used in the past.

Varieties used for drying: Traditionally, most apricots that were dried were of the Blenheim variety, which produced a high quality product with rich flavor and good drying ratio (fresh weight versus dried weight). Blenheim is still the predominant variety in the Hollister/Gilroy/Morgan Hill area of the Central Coast. In recent years, Paterson has become the major drying variety primarily due to high yields and availability of fruit that was no longer

needed for the canning market. Paterson is primarily grown in the Central Valley. Early Cot and a small quantity of fresh varieties are dried also.

Varieties for fresh market: Several varieties are used in local producing areas such as Contra Costa County, the Santa Clara Valley, San Benito County and various locales in the Central Valley. Blenheim and occasionally Moorpark/Hemskirke varieties are still used for roadside stands and farmers markets. There is interest in specialty varieties like the “Candy Cot” series that are characterized by very high sugar and nice appearance.

There are some standard varieties with lower chilling requirements (Castlebright, Katy, and Paterson) that may be suitable for parts of the state with warm winters. Low chill varieties that may be useable for farmers markets or fruit stands are: Autumn Glo, Castlebright, Earli Autumn, Early Golden, Flavor Giant, Flora Gold, Gold Kiss, Katy, Nugget, Royal Rosa and even Blenheim.

In the San Joaquin Valley, traditional older varieties have been replaced due to their tendency to have a disorder called “pit burn.” Growers are planting an assortment of newer “proprietary” varieties where the grower, packer and nursery have a contractual agreement. Information about these new varieties can be obtained from their respective nurseries.

For fresh market operations, a common strategy is to plant a range of varieties that ripen over an extended time as a way to reduce peak labor demands and exploit more market “windows.” Apricots have a slight tendency towards alternate bearing (a heavy crop followed by a lighter crop the next year) when crop size is not controlled by pruning or thinning. New varieties from public and private breeders are periodically introduced.

Rootstocks

Rootstock selection is as important as variety selection. Rootstocks used in California are Myrobalan 29C plum, Citation peach-plum hybrid, Marianna 2624 plum, Nemaguard and Lovell peach. Choice will depend on desired tree size, soil type and any continuing problems such as soil pH, salinity, soil pathogens and nematodes. Some newer orchards are using size-controlling rootstocks to facilitate ladder-free systems. In the San Joaquin Valley, most new plantings are

on Citation with a few on Nemaguard. In the Brentwood district, Nemaguard, Lovell, Marianna, Myrobalan and Citation are all used. In the Central Coast, Marianna 2624 is commonly used because it is better adapted to the clay soils and the accompanying problems of phytophthora and armillaria root rots.

Information about rootstocks can vary according to author. Following is general information:

Citation: Gaining popularity with apricot growers. Slightly dwarfing. More tolerant to wet conditions or to drought. Less susceptible to bacterial canker. Reportedly more tolerant armillaria and root knot nematodes.

Nemaguard: Sensitive to wet conditions, adapted to well-drained, sandy soils. Susceptible to armillaria root rot, phytophthora rot and bacterial canker. Resistant to most strains of root knot nematode.

Lovell: Sensitive to wet conditions, adapted to well-drained, sandy soils. Susceptible to armillaria root rot and phytophthora rot. Some believe it is a little more resistant to bacterial canker. Susceptible to root knot and lesion nematodes.

Marianna: More tolerant wet conditions. Moderately resistant to armillaria root rot and phytophthora rot. Very susceptible to bacterial canker. Resistant to root knot nematodes. Susceptible to lesion nematode.

Myrobalan 29C: More tolerant to wet conditions. Not as resistant to armillaria root rot as Marianna. Moderately resistant to phytophthora rot. Susceptible to bacterial canker. Resistant to root knot nematodes. Susceptible to lesion nematode.

Equipment

Equipment commonly needed for a 40 acre orchard might include a 40 to 60 horsepower wheel tractor, a 9-foot off-set disc, an orchard mower/brush shredder, a three-point push scraper, a weed sprayer, three point forks for moving harvest bins, a hydraulic pull scraper, an orchard sprayer, a forklift, and several bin trailers. A furrower or ridger will be needed if the orchard is furrow or flood irrigated respectively.

MANAGING THE ORCHARD

Training and Pruning

A minor portion of the fruit is borne laterally on one year old shoots. A major portion of fruit is borne laterally on spurs that live three years. Apricot trees must be trained to provide a strong framework capable of supporting a large crop and accommodate harvest equipment. Apricots need to be pruned every year to maintain consistent, uniform yields and good fruit size. The most common training system is open center. Many trees benefit from having a rope or wire strung around the scaffold limbs to prevent breakage from heavy crops. At the time of this writing there are no UC publications available about pruning and training apricots. The open vase training system that is common in many regions is described in more detail in Chapter 8 of ANR publication 3331 – Peaches Plums & Nectarines – Growing for Fresh Market. Some newer plantings are utilizing a high density perpendicular “V” configurations. Some are freestanding and some have training wires.

Because pruning wounds can become infected with the fungus *Eutypa lata*, pruning is done in late summer, early fall or late spring to avoid rains, which can spread the disease. Minor amounts of pruning may be done in summer to improve light penetrations. It is possible to treat larger pruning wounds with a fungicide to protect them from infection. Current pest management guidelines are found in the online UC Pest Management Guidelines (<http://www.ipm.ucdavis.edu>).

Orchard Floor Management

Weed management in apricots is similar to that used for other tree crops. Competition from weeds will significantly slow growth of young trees. In mature orchards, weeds may be host to thrips and other pests. Common systems usually involve using herbicides around base of the tree or along the tree row or berms. The row middles or centers are either mowed or cultivated. Growing a cover crop between the tree rows is common in some areas because it enables equipment to drive in the orchard earlier after a rain event and possibly provides habitat for beneficial insects and spiders. Most growers simply utilize the resident vegetation

already growing in that orchard, a few plant specific species. A detailed discussion can be found in UCANR publication # 21627- Cover Crops for Walnut Orchards, and ANR publication #3338 – Cover Cropping in Vineyards.

Fertilizing

Depending on tree vigor, apricots are fertilized with low rates of nitrogen per acre per year, applied during the growing season. The color of the leaves in conjunction with the desired amount of growth is a good guide as to how much nitrogen is applied. In the Central Coast, 40 pounds of actual nitrogen may be applied if needed but none is applied if vigor is sufficient. No data is available about rates common for the Central Valley. Like the Central Coast, 0 to 40 pounds would be a reasonable range. If there is nitrogen in the irrigation water, that must be taken into consideration when making recommendations about nitrogen fertilizer rates.

Other than nitrogen, zinc is the element most likely to become deficient on sandy soils and foliar sprays containing zinc are commonly applied. Apricots can also become potassium deficient in sandy soils and areas where topsoil has been removed by grading. Potassium deficiency is commonly corrected using large applications of a potassium fertilizer every 3 to 5 years or with lower annual applications. Apricots may become iron deficient in high pH or calcareous soils, which can be corrected by lowering the soil pH.

A laboratory leaf analysis can provide excellent information about the nutrient status of the trees. Based on the analysis, the lab can also make recommendations about fertilizers

Thinning

California's climate is excellent for heavy production of apricots, but an orchard's profitability is based on the grower's ability to consistently produce moderate crops of good-sized fruit. Excessive crops on individual trees generally result in smaller, lower-valued fruit. Growers must use a combination of pruning and fruit thinning to regulate crop size. Currently thinning is performed by hand and at considerable cost. UC researchers are experimenting with mechanical systems that would reduce that cost. Chemical thinning is not used.

PEST MANAGEMENT

Insect pests that usually require annual treatment are peach twig borer and some other worm pests depending on the region. Pests that must be monitored are peach twig borer, fruit tree leafroller, oblique-banded leafroller, stink bug, orange tortrix, European fruit lecanium, katydids, mites, aphids, and leaf-footed plant bug. Any of these may need treatment in some years. Pest complexes vary considerably by region; check with local UC Farm Advisors or pest control advisors for local advice.

Warm, wet weather during bloom time can lead to brown rot blossom and twig blight, which can cause major economic losses. Rain as fruit begins to ripen can cause fruit brown rot. Shot hole disease can damage buds, leaves, twigs and fruit. Jacket rot or green fruit rot may damage young fruit. It occurs some years with continued wet weather after bloom. In sandy soils, bacterial canker can damage buds, shoots and even large limbs. Apricots are very susceptible to *Eutypa* dieback disease, which is a major cause of limb and scaffold loss. Apricots are often pruned in summer rather than in the dormant season for areas that are prone to *Eutypa* infections to reduce infections. Powdery mildew is an occasional disease and disease severity is temperature dependent.

Roots can be damaged by *Armillaria* root rot and by *Phytophthora* root and crown rot disease. On sandy soils, nematodes can greatly reduce the root's ability to absorb nutrients. Injured roots and crowns can become infected with crown gall disease, which will disrupt the vascular system and stunt the tree.

For control measures for the above, and a complete list of pests and diseases that afflict apricots, refer to the UC Pest management Guidelines (<http://www.ipm.ucdavis.edu>). An excellent reference is *Integrated Pest Management for Stone Fruits* – UC ANR publication 3389 available for sale at most Cooperative Extension offices or through anrcatalog.ucdavis.edu.

HARVESTING

Grade and size standards depend on how the fruit is to be utilized. In all grading programs, worms and rots are cause for culling. Higher soluble solids or maturity is desirable

up to the point where fruit softening and bruising would occur. Higher soluble solids result in better dry-away ratios and larger fruit after drying. Skin color is not important for processed fruit but it is paramount for fresh packed fruit. Processors, dry-yards and packers will prescribe what maturity standards are required for product to be accepted. As of this writing there is no third party grading program in place.

Since all fruit on the tree does not ripen simultaneously, a grower may have to do two or three pickings based on color. This can be especially common in sandier soils. Finding sufficient labor for harvest can be challenging in some years. Mechanical harvesting is an option for fruit intended for processing or drying. There are two types of mechanical harvesters – an upside-down umbrella catch-frame, and the more common side-by-side catch-frames. Both utilize a trunk shaking mechanism. An option is to hand pick according to color first and follow up with machine harvesters when the rest of the fruit are mature. In-field sorting of small or damaged fruit is common. Successful machine harvesting is predicated on using machines that are well designed, well maintained, and carefully operated. Harvesting is often done in the early morning when fruit temperatures are low and less prone to bruising.

Detailed guidelines for harvesting and handling can be found at <http://postharvest.ucdavis.edu> and according to those guidelines: High consumer acceptance is attained for fruit with high (>10%) soluble solids content (SSC) and moderate acidity (0.7 to 1.0%). Apricots with 2 to 3 pounds-force flesh firmness are considered "ready to eat". Apricot cultivars have a rapid rate of fruit softening (3 pounds-force per day at 20°C (68°F).

MARKETING

Fruit for drying and processing is often marketed under a single or multiple year contracts that specifies the terms of the transaction. Pricing is usually on an “orchard-run” basis – that is after the fruit is picked and loaded onto a truck but before it is processed. Fresh market fruit is often sold on a consignment basis. There are many variations. At the time of this writing there are no marketing orders or commissions for apricots. Apricot Producers of California is a bargaining association on behalf of its members. Marketing assistance and

promotional materials are also available from the Apricot Producers of California. Prospective growers should talk to as many buyers and marketers as possible to best determine a marketing strategy. Growers should also inquire from other farmers about reliability and reputation for on-time payment and adherence to agreement terms. Contracts should be reviewed by a lawyer. Quality and maturity standards should be agreed to in writing before harvest commences. More processors are using longer-term contracting because of the limited number of acres available.

WHERE TO GET MORE INFORMATION

The University of California has Cooperative Extension offices in almost all counties with Farm Advisors that specialize in the crops of that region. They can be contacted free of charge for assistance. Go to **ucanr.org** for locations and more information. The Apricot Producers of California can be contacted at [http:// ApricotProducers.com](http://ApricotProducers.com) or 209/632-9777 and the California Apricot Council at <http://califapricot.com>.

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