Texas Fruit & Nut Production

AgriLIFE EXTENSION
Texas A&M System

Avocados

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Introduction

Avocado is a widely consumed fresh fruit in Texas households, due in part to the popularity of "Tex-Mex" cuisine. Avocado fruit is a large berry with unique nutritional components. The flesh is approximately 15% oil or fat, much of which is in the healthy, monounsaturated form. Avocado is higher in potassium than banana, and a good source of vitamin K, vitamin E, and B vitamins, especially B6 and B5. The fruit has been studied for its role in lowering cholesterol and limiting certain forms of oral cancer.

Avocados are considered tropical fruit trees. Other names for the fruit are "Alligator Pear" and "Aguacate" (Spanish). Mexico leads the world in production with over 1 million metric tons produced annually. Commercial production in the U.S. is in California (65,000 Acres), Florida (6,500 Acres), and Hawaii (600 Acres). Commercial production in Texas is so small that it is not reported in USDA statistics.

The only counties in Texas considered neotropical in climate and would be suitable to consider commercial avocado production lie in the Rio Grande Valley of Texas, wherein avocados represent a very small percent of commercial farm acreage.

Despite the tropical requirements for growing avocados, the fruit is grown in protected landscapes in the lower half of the state with limited perennial success, due to freezes. Experimentation with avocados in the Wintergarden region south and southwest of San Antonio has produced varieties purported to survive the winters of that area with little damage. These varieties have not been evaluated in long-term formal experiments, so attempts at commercial plantings should be considered very risky unless active freeze protection or climate control is provided.

Botany

Avocados are classified as one of three species of tropical fruit tree; including Guatemalan (*Persea nubigena* var. *guatamalensis* L. Wms.), Mexican (*P. americana* var. *drymifolia* Blake), and West Indian (*P. americana* Mill. var. *americana*). Interspecific hybrids of all three types have created additional varietal types. These evergreen trees can grow to 40 to 80 feet in height. Leaves are large, leathery, deep green in color with paler veins, and have a 2-3 year longevity. Leaves that have reached maturity will shed each spring. Blooms form from January to March, with fruit maturing in as few as 6 months for Mexican types and 18 months for Guatemalan types.

Varieties fall into one of two pollination types; referred to as Type A and Type B; the differ-

ence being what time of day (morning vs. afternoon) the male and female flowers are capable of reproduction.

Flowers of type A varieties open in the morning as receptive females, then close in the afternoon until the following afternoon when they reopen for pollen shed. Type B avocado flowers open in the afternoon as receptive females, close overnight and reopen the following morning to shed pollen. In important avocado-producing areas, orchards are interplanted with varieties of both types to assure good pollination. However, under South Texas conditions, there is sufficient overlap between the phases of a flower type that pollination and fruit set are rarely a problem.


Mexican race avocado

Fruit size likewise varies considerably among the species. West Indian varieties produce very large fruit, which is low in oil and has a milder flavor than the other types. The fruit of Mexican types is rarely larger than 8 to 12 ounces, is green to purple or black, and has very thin skin. Because the skin is so thin, the fruit are very susceptible to disease. Guatemalan varieties are essentially intermediate between the former two, and its hybrids with the other two races include many of the more important varieties in commerce. The pebbly-skinned 'Hass' avocado, the most widely grown and consumed avocado, is a Guatemalan variety seedling.

Climate

The most limiting factor to success with avocado trees is severe cold. Avocado is a tropical to subtropical tree. West Indian types tolerate almost no subfreezing (32 F and below) temperatures. Guatemalan types may tolerate slight subfreezing temperatures of 26-30 F. Mexican types are the most cold hardy and suited to Texas' climate, with some varieties tolerating temperatures around 19-20 F as mature trees. Cold hardiness of the variety and the depth and duration of the freeze determines whether the tree sustains partial damage to the above-ground tissue, total death of all above-ground tissue, or total death of all portions of the tree (above and below-ground).

Mexican avocados have been the focus of research and variety selection aimed at improving the cold hardiness and thus the range in Texas for growing avocados. The Texas Avocado Society was formed in Weslaco in 1948 as an association of growers and horticulturists seeking promising varieties from Mexico and Florida to develop a major commercial crop for South Texas. Variety performance has been studied by Texas A&M scientists, like the late Norman Maxwell in the 1960's, and more recently by plant hobbyists and nurserymen. Their collective effort has identified varieties that have escaped recent severe freezes with little to moderate damage. It is important to understand that trees in residential settings may have microclimatic advantages that trees planted systematically in orchards might not. Avocados today remain a marginal and risky plant to grow north of the Rio Grande Valley despite the claims and testimonies otherwise.

Soil and Site Selection

Avocado trees are adapted to a wide range of soil types, preferring coarse, well-drained soils. Trees will not tolerate flooding or poorly drained soils. A range of pH values from acidic to alkaline is acceptable. Soil salinity can be a problem with avocados, and soil and irrigation water should be tested prior to planting. If salinity is a problem, one of the West Indian varieties may be used as a rootstock, because of their greater tolerance to salinity. Mexican varieties, in particular, are not salt-tolerant, and may need to be grafted if salinity is a potential problem.

The planting site should be chosen with cold protection in mind, especially in areas where annual winter frosts or freezes are common.

Generally, the south or southeast side of the house is the warmest location in a residential site. Avocados grow to large stature, and thus should be planted no closer than 10 to 15 feet from the house.

Freeze Protection

Deep planting and soil mounding around the trunk are the best assurances that avocados will survive a severe freeze, even if the top is completely killed. When a severe freeze is forecast, mound additional soil around the trunk for extra protection, then water thoroughly two or three days before the cold weather is expected. Young trees can be draped (not wrapped) with a blanket, quilt, tarp or even plastic during the freeze event. The corners of the covering should be pulled outward and anchored to the ground--it is not necessary that the covering reach to the ground. Any additional practical heat source under the tented tree will probably save even the leaves. Examples include incandescent lights, decorative lights, electric heaters and camp lanterns or stoves.

More permanent enclosures, like high tunnel greenhouses, should be considered for those growers who desire a small-acreage commercial planting of avocados outside the Rio Grande Valley. High tunnels rely on solar radiation storage, ice formation from water sprinklers, lights or other inexpensive, passive means of preventing plant damage during freeze events. True greenhouses with climate-control capabilities would also be an effective, albeit expensive means of freeze protection. The size potential of avocados creates some challenges for permanent culture inside structures.

Propagation and Planting

Avocados do not come true from seed, and seedlings may take up to 10 to 15 years to fruit if not grafted. Seedlings grown from supermarket fruit seeds may also exhibit moderate to severe leaf tip burn and marginal necrosis from salt injury. Consequently, they should usually not be grown as seedlings for rootstock use.

Propagation in Texas is mostly by cleft (tip) grafting, but other grafting methods work. Some Mexican avocado varieties can be rooted or air- layered, although the potential lack of salinity tolerance remains a problem for such own-rooted plants. Avocado grafts are commonly positioned close to the soil line of the rootstock. It is common practice to plant the tree deeper than normal so that the graft is at or below ground level. In addition, soil is mounded around the trunk as the tree grows to assure that the graft union is below ground. Thus, trees killed to the ground by severe cold will regenerate from varietal (grafted) wood rather than from less desirable rootstock.

Avocado trees are produced in containers of soilless media, and much of the outer layer of media should be washed off the sides and top of the root ball just before placing the tree in the planting hole. This encourages rooting out into the soil of the site, rather than continuing the pot-effect.

In commercial plantings newly-planted trees are usually staked for support and shaded during the first several months of hot temperatures and high sunlight. A burlap-covered cage about a foot higher than the tree is commonly placed around the tree in the Valley for both shading and wind protection. In multiple plantings, avocados should be spaced 20 to 30 feet from each other and from other large trees. Fruit production is greatest in full sun conditions.

Culture

Weed and grass competition around newly planted trees is critical during the first two or three years. Following initial treatment of the weeds with herbicides or mechanical means, organic mulches can effectively suppress weed re-growth. Avocado irrigation is similar to citrus and other fruit and nut trees; water should be applied at a rate and frequency that will prevent wasting water or standing water around the tree for more than a few hours.

Fertilization of avocados is essentially the same as for other fruit and nut trees in South Texas: ammonium sulfate (21-0-0) at the rate of one half cup per month in the first year, one cup per month in the second year and two cups per month in the third year. Fertilization should be applied monthly from February to September. Thereafter, apply one to two cups per year per inch of trunk diameter, split into equal applications in February, May and September.

Avocados do not require training or pruning for normal growth and cropping. Freeze-damaged trees should be pruned to remove dead wood. If only limb damage occurs, wait until re-growth commences and cut back to live tissue. If the tree is killed to the ground, cut it off at ground level. If the roots are alive, numerous suckers or trunks will emerge (hopefully above the graft line) that will need to be pruned if a single-trunk tree is desired.

Varieties

The best varieties for Texas are largely seedling varieties of the Mexican type avocado, because of their better freeze tolerance. Guatemalan and West Indian types or hybrids thereof may also be grown, if expectations for surviving freezes are kept low. Historically, seedlings are discovered that escape a harsh winter or two; unfortunately upon further propagation these same trees sustain severe injury in succeeding harsh freeze events. Fruit quality is variable, with some more appealing than others. For the varieties described below, no formal variety trials have been conducted to determine those that are superior in production, fruit quality or freeze tolerance in Texas conditions.

'Brogdon'

'Brogdon'-complex Mexican hybrid variety; oval to pear-shaped fruit, with thin skin that becomes purple in color upon maturity. A nice quality variety with average to below-average cold hardiness compared to other Mexican types. Flowering Type B.

'Hass'- a Guatemalan seedling or hybrid variety, which is the main commercial variety in California. Skin is black in color, thick, and rough textured, allowing it to ship well. Produces a good quality, well-liked fruit, but the tree has little freeze tolerance and should only be planted in frost free areas or where frequent protection from cold can be given. Also is best suited to arid, dry climates.

'Holland'- a Mexican race seedling tree found by the Holland family in Uvalde, Tx. The variety grew well and survived several hard winters in Uvalde, but was killed to the ground in the severe 1989 freeze event with temperatures in the 'teens'. Fruit skin is green in color, and quality is less than optimum having thick, rubbery flesh texture. This variety is also sold under a registered trademark name: **'Opal'®.**

'Lula'- a popular Guatemalan x West Indian hybrid variety grown commercially in the lower Rio Grande Valley. Originated in Florida. Bears individual pear-shaped fruits nearing a pound in size and having a green, thick peel which resists disease quite well. Flesh is slow to oxidize (darken) making it popular for restaurant use. It matures in October and stores well on-tree into January or February. 'Lula' sustains severe freeze damage below 27 degrees, although it commonly regrows from below ground. Seeds from 'Lula' are the preferred rootstock for all avocados in South Texas. Flowering Type A.

'Wilma'™ -A Mexican avocado that originated as a seedling near Pearsall, Texas. Tree

has demonstrated good cold hardiness and is being planted in landscapes from Austin to San Antonio to Houston. The fruit is large in shape and has good flavor. The skin is black in color. Nurseries propagating this variety must acknowledge that the name is trademarked, limiting its use for marketing and promotional purposes.

'**Winter Mexican**'-A Mexican hybrid avocado that has been popular in the Valley for many years. Excellent cold hardiness and good heat tolerance, with average to fair fruit quality. Thick, green skin with fruit maturing in December.

Production, Maturity and Use

Grafted varieties will produce a few fruit two or three years after establishment if the tree has grown well and been protected during winters. Mature trees can produce two to three or more bushels of avocados with good management, depending upon variety. Mexican-race seedlings and varieties typically mature during the summer; 'Lula' and most other hybrids mature in September or October. Storage on-tree is common, and 'Lula' will store on-tree into January because of cooler temperatures.

Oil content increases with time on the tree for many varieties. Avocado fruits do not ripen on the tree--they must be harvested and held for several days before they are ready to be consumed. The optimal temperature range for ripening includes the cooler range of most home air conditioning settings. Avocado maturity, if unknown, can be easily determined, as the fruit is mature when it will soften to good eating quality. Pick a couple of fruit and set them on the kitchen counter (out of direct sun). A mature fruit will soften within three to eight days. If the fruit don't soften, try again every week or so with new fruit until you achieve softening. When fruit softens, check it for eating quality. Summer-maturing avocados will begin to drop heavily because of disease as they mature. Some types do not always soften well under Texas conditions. For the most part, avocados are consumed fresh, alone or in salads, dips, appetizers, guacamole and 'pico de gallo'. Overripe fruit can be pureed and frozen for later use, particularly for avocado cream soup and dips. The peel or rind of the fruit is undesirable to eat on thick-skinned varieties, but quite edible on thin-skinned varieties, in some cases adding pleasing, unique flavors.

Pest Problems

The most common problem of avocados in Texas is tip burn and marginal necrosis caused by water stress and salinity, which is most prevalent during hot, dry weather. This problem is most acute on Mexican-race seedlings and rootstocks; it can be tempered somewhat by more uniform and regular watering. Avocados shed foliage during the spring flowering period, and some varieties drop more than others during this time. New leaves will develop almost immediately.

The most serious disease of avocados is anthracnose, which is primarily a disease of fruit nearing maturity. It starts as circular, sunken brown to black spots that are quite small. With time, the spots can enlarge to half an inch or more and are prone to cause the fruit to crack horizontally and vertically across the spot. Anthracnose is particularly severe on thin-skinned types, but rarely causes significant losses on 'Lula' and other thick-skinned fruits. Other fungal diseases such as cercospora spot, powdery mildew and scab are rarely encountered in Texas, but are serious problems in the humid tropics.

Few insects have been documented on Texas avocados, although mites sometimes occur on the foliage. None has been severe enough to warrant control measures. Opossums apparently thrive on mature avocado fruit and will climb the tree to feed in the absence of fruit on the ground.

For More Information

http://aggie-horticulture.tamu.edu/fruit-nut

Acknowledgments

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