

# Producing Texas Fruits and Nuts Organically

Julian W. Sauls, Marty Baker, Sammy Helmers, John Lipe,  
Calvin Lyons, George McEachern, Loy Shreve and Larry Stein\*

**P**ublic concerns about food safety and the environment have stimulated interest in producing fruits and nuts organically. Organic production is widely embraced as a means to better health and environmental quality because of total avoidance of synthetic fertilizers and pesticides in food production. This does not imply that organic pesticide or fertilizer sources are completely safe and do not require precau-

tions governing their use in food production. All pesticides and fertilizers should be used with caution and only in accordance with applicable label directions and/or sound production and safety practices.

This publication does not debate issues of environmental quality or food safety, nor does it discuss the controversies of organic versus commercial production methodologies. This publication

describes production principles and practices which can be used in organic fruit and nut production. It summarizes the organic food production certification program established by the Texas Department of Agriculture. Major limitations of pests, diseases and nutritional disorders of fruits and nuts in Texas are described, along with a rating of the relative potential for organic production of each fruit and nut.

## Horticultural Principles and Practices

**A**dherence to sound horticultural principles and practices is essential to the growth, development and fruiting of healthy, vigorous orchard trees which can best resist or overcome pest or disease problems—from planting through the life of the orchard. Proper site selection, plant selection, spacing, pruning, irrigation, fertilization, weed control and other practices will reduce or eliminate the plant stresses which so often catalyze increased pest or disease problems.

### Site Selection

Orchards require deep soils having both good surface and internal drainage. Surface drainage refers to surface runoff to avoid standing water after heavy rains. Internal drainage is the ability for water to percolate downward through the soil to prevent root zone saturation and remove accumulated salts. Alluvial bottomlands will normally be the most fertile soils, but upland soils are more plentiful. Extremely sandy soils are quite good for orchards, but are normally very low in fertility and organic matter. Orchards for organic fruit produc-

tion should be planted on only the most fertile soils available.

Soil pH in Texas ranges from strongly acidic to highly alkaline. Choices of fruits and nuts are limited by the soil condition. Alkaline soils may result in micronutrient deficiencies in some crops, particularly stone fruits, pome fruits and berries. Conversely, some crops, such as blueberry, thrive only in highly acidic soils.

### Adapted and Resistant Varieties

In order to be productive, fruit and nut trees must be adapted to local climatic and soil conditions.

\* Extension Horticulturists, The Texas A&M University System.

Some fruits and nuts simply are not adapted to Texas conditions, and individual varieties perform better in some parts of the state than others. The first principle of fruit production: use only those varieties recommended for the immediate area. Complete listings, updated regularly, are available through the Texas Agricultural Extension Service and its local county Extension offices.

A prime component of varietal adaptation is the concept of resistance to various pests or diseases. Classic examples of resistant varieties are 'Nemaguard' rootstock for peaches and other stone fruits (nematode resistance); grape varieties resistant to Pierce's disease; and citrus rootstocks resistant to or at least tolerant of *Phytophthora* foot rot and root rot. Closed-eye fig varieties such as 'Alma' resist fruit souring caused by the dried fruit beetle, and pear production is assured with fire blight-resistant varieties.

Fruit breeders typically use disease resistance as a screening technique during evaluations of breeding lines to eliminate those plants which are susceptible to various limiting diseases. Because most fruit and nut trees are long-lived, growers rarely have the opportunity to change varieties whenever new types are developed. Consequently, only the best-adapted, resistant varieties should be planted for future productivity.

## Irrigation

Irrigation water should be timely and efficiently applied to optimize growth and conserve water. Drip irrigation systems are great for young tree establishment. Drip tapes or tubes are good for closely-spaced plantings such as blackberries, blueberries, grapes and others. Older, larger trees and

wider spacings favor micro-sprayer irrigation or high-volume systems. To reduce the probability of diseases, schedule irrigation to start in early morning and conclude by mid-afternoon to prevent undue leaf wetness or microclimate alteration during the early evening and night. Mulching assists in both water conservation and avoidance of moisture stress.

Irrigation water must meet established standards for quality, particularly with respect to organically non-compatible contaminants.

## Weed Control

Weed control is essential to young tree establishment and good tree growth. Weeds can be controlled mechanically or by manual cultivation, but control is usually delayed until after unfavorable weed competition has occurred. Tillage incorporates crop residues and other organic wastes into topsoil. However, deep tillage is deleterious to plant roots and soil moisture relations and should be avoided except in serious cases of soil compaction. Frequent, very shallow tillage is recommended to control weeds without damaging tree roots and without causing undue soil drying. This shallow tillage permits good water penetration without exposing additional weed seeds from deeper levels of the soil, thereby reducing weed pressure over time.

Mowing of sod middles, with shallow tillage along the tree rows and/or mulches beneath the tree, reduces soil compaction and erosion and fosters soil microbes and macrobes. However, sod middles compete for available water and nutrients. Electrical or flame weeding equipment can be used,

but may not be practical or safe under orchard conditions. Careless or uncontrolled fire can kill fruit and nut trees rapidly.

## Soil Fertility Management

Soil amendments must contribute to overall soil improvement as well as improve growth and production. Manures, tillage of residues, compost, green manure crops and nitrogen-fixing intercrops are most adapted to orchard systems. Soil improvement is gradual, usually requiring many seasons of intensive management to improve and maintain soil fertility.

Organic fertilizers are not normally well-balanced in major nutrient content, with most disproportionately high in one nutrient. Consequently, a variety of organic materials may be required to meet nutritional needs of fruit crops. Because fruit trees are perennial and most Texas soils are relatively fertile, the extensive root system can extract nutrients from the soil as they become available. Nitrogen may be the most commonly limiting fertilizer element.

It is essential to ascertain the nutrient content of the fertilizer being used to guide relative application rates. Soil test samples should be collected and analyzed each summer to determine the status of essential elements in the soil. Because the soil test measures total nutrient content without determining the availability of those nutrients, tissue analysis should also be performed to determine the actual nutrient status of the trees. The nutrient content of the fertilizer(s), soil and tree will provide an accurate nutritional program for the orchard to assure optimum growth and production.

**Nitrogen.** Nitrogen is readily leached from the root zone and is the most likely nutrient to be limiting to growth. Common sources of supplemental nitrogen include various animal manures, green manures, cover crops, nitrogen-fixing intercrops and microbes, and compost. Vegetable meals, animal hides, fish emulsions, blood meal or meals made of other animal by-products are not considered to be organic by Texas Department of Agriculture (TDA) standards, so they may only be used temporarily with TDA approval.

**Phosphorus.** Phosphorus is rarely limiting in Texas soils, particularly in perennial orchard crops, as most established trees can obtain adequate phosphorus as it becomes available through soil reactions. Hard-rock, soft-rock and colloidal phosphate, bonemeal and bat guano are common organic sources of phosphorus. Neither food-grade orthophosphoric acid, fish emulsions, soap phosphates nor basic slag are considered organic by TDA standards, so approval must be obtained for temporary use.

**Potassium.** Potassium is not often limiting in most Texas soils, although acid soils and deep sands may be deficient. Organic

potassium sources include wood ashes, dusts of granite, feldspar and greensand, sulfate of potash magnesium (langbeinite), natural potassium sulfate, kainite and recycled potassium-rich organic matter.

**Calcium.** There are very few documented cases of calcium deficiency in Texas fruit and nut production. Agricultural limestone (dolomite) should not be used on alkaline soils. Gypsum, kiln dust, calcified seaweed, corn calcium and calcium oxide are calcium sources useful on acidic or alkaline soils. Neither calcium chloride nor ground oyster shells can be used without TDA approval.

**Magnesium.** Magnesium is rarely deficient in most tree crops in Texas, but supplemental magnesium is available in dolomite (not for use in alkaline soils), kieserite and sulfate of potash magnesium (langbeinite). Epsom salts can be used temporarily only with TDA approval.

**Sulfur.** It is unlikely that sulfur deficiencies would be observed in orchards, but elemental (mined) sulfur is often applied to the soil in a limited attempt to lower soil pH.

**Micronutrients.** Micronutrient deficiencies are common in some

tree crops in Texas, including zinc in pecans and peaches, and iron in peaches and other stone fruits, pome fruits and blackberries growing in alkaline soils. Seaweed extract, kelp meal and natural rock powders are limited sources of some micronutrients. TDA may approve the temporary use of fritted and chelated micronutrients, fish emulsions and/or acid-treated elements of zinc, boron, copper, iron, manganese and molybdenum.

## Growth Regulators, Activators and Inoculants

Growth regulators, activators or inoculants seldom have any decided impact in fruit and nut production. However, sources that may be used include:

- seaweed extracts
- natural enzymes
- herbal preparations
- rhizobial inoculants
- nitrogen-fixing microbes
- bluegreen algae
- cellulolytic bacteria
- natural root hormones
- humates
- adjuvants

## Cultural Practices for Preventative Pest Management

In most cases, wider than normally recommended spacings between trees and rows for conventional production can lessen pest and disease pressure significantly by improving air circulation and reducing the duration of leaf wetness. Some trees can be pruned to more open canopies and with higher skirts to lessen disease pressure by virtue of in-

creased air circulation beneath and through the tree. Raised skirts limit some pests by eliminating easy access via limbs near the ground.

Planting depth should be equal to or higher than that of the tree in the nursery to protect the scion from soil-borne diseases. This is particularly critical in citrus, as citrus trees planted too deeply or in

a low area will contract foot rot, root rot or both—and die within a couple of years.

Crop rotation and altered planting or harvest dates are routinely applied in the production of annual crops, including strawberries, but are not practical for perennial fruit and nut trees, shrubs or vines. Altered harvest dates provide little or no practical pest or

disease relief in most fruit crops. Harvest at any time other than the peak of maturity is usually detrimental to fruit quality, taste and appearance. However, varieties which mature earlier in the season are usually subject to less pest and disease pressure.

Companion plantings and trap crops are widely touted as deterrents to some pests, although there is little proven substance to many of the claims. Either would be difficult to establish and maintain under standing trees because of shading and competition. Establishment in row middles may be easier, although not assured, but such practices could restrict necessary tillage operations or other cultural practices within the orchard, to the detriment of tree health. Moreover, companion plants that may be favored hosts of serious pests (such as spider mites) should be avoided.

Mulching with organic materials is highly beneficial in many orchard crops. It precludes weed growth, lowers soil temperature in the root zone, conserves water, reduces soil erosion and increases

microbial and macrobial activity within the mulch and soil, increasing humus, organic matter, water percolation and soil nutrition. Mulches may increase disease pressure by maintaining increased humidity within a tree microclimate; e.g., mulches increase the incidence and severity of foot rot of citrus trees.

Reduction of soil temperature has other aspects that need consideration. Growth in the spring could be delayed, and transient micronutrient deficiencies do occur under cold soil temperatures. Cooler soil temperatures are not favorable for freeze-prone or frost-sensitive crops, as lower soil temperature means less energy in the soil to warm trees on cold nights. Too, mulches inhibit the release (as well as the absorption) of radiant energy, which could be important on cold nights. Thus, mulches should be applied to cold-sensitive crops only after the danger of late frost has passed.

Sanitation and crop residue removal can be particularly important in some fruit crops. Remove diseased plant parts and pest-in-

fest residues promptly. Destroy them to reduce further damage during the current season and to eliminate overwintering sites for pest or disease carryover to the following season. Prune infected tissues carefully to prevent unintentional spread of the disease organism. Practice heat sterilization of pruning equipment, particularly in the case of virus diseases, to prevent infection of other plants.

Residues may be composted for subsequent use, although many composting operations may not be adequate to kill overwintering pests or disease organisms. To be safe, it may be preferable to shred larger materials and subject all crop residues to solarization prior to composting. Solarization is commonly used to control weeds and pests in the soil prior to planting and can be readily adapted to treat crop residues before composting. Exposing well-moistened crop residues—layered and sealed between two sheets of clear plastic—to several days of Texas sunshine will effectively destroy pests and disease organisms.

## Pest Management

**P**revention of pest or disease problems is the primary consideration in the production of fruits and nuts. Use sound horticultural principles to maintain vigorous, healthy plants free of stress that leads to pest or disease problems. Some fruits will never be free of pests or diseases; others will be affected sooner or later by various problems which limit production, quality or both, and may require control measures.

### Biological Control

Biological pest control is the use of natural parasites, predators and pathogens to reduce pest populations below damaging levels. Hundreds of biological control agents exist, but most are quite small and rarely observed. Many are host specific, attacking only a limited number of species of pests. Biological control has many successes, particularly in citrus, but complete eradication of a pest is extremely rare—there must be a pest population present

in order to sustain a population of biological control agents. Thus, some damage to orchards and fruits or nuts is to be anticipated.

Green lacewings, praying mantids, vedalia beetles and lady beetles are well-known predators that feed voraciously on aphids, mites, leafhoppers, thrips, mealybugs and others. *Bacillus thuringiensis* (Bt), a popular bacterium, effectively controls the larvae of several moths and butterflies. A large variety of birds consume hundreds of worms and other insects (including many of the benefi-

cial). Tiny *Trichogramma* wasps attack the eggs of butterflies and moths, while other parasitic wasps attack other pests, including scales, whiteflies and blackflies. *Hirsutella* is a fungus that attacks some mites; *Aschersonia* is another fungus that attacks pupae of whitefly.

Many beneficials occur naturally in the orchard. Others can be purchased from rearing facilities and introduced into the orchard. Fungal and bacterial beneficials may require certain climatic conditions (such as high humidity) to survive. It should be reiterated that a pest population must exist and be maintained, or introduced beneficials will die or leave the orchard.

## Mechanical Pest Control

Mechanical pest control devices are useful to deny pest access to parts of the tree or its fruits. Metal collars and sticky barrier strips (such as Tanglefoot) around tree trunks prevent rodents and crawling insects from reaching foliage or fruits. Low hanging branches, particularly when laden with fruit, should be pruned up to deny ready access from the ground. Bird netting over smaller trees, vines and shrubs will preclude bird predation on fruit and could exclude numerous flying insects, depending upon mesh size.

Soapy water sprayed vigorously onto aphids and whiteflies will wash them from the plant. Whiteflies may return, but aphids rarely go back up the tree. Tent caterpillars and webworms can be treated with fire, particularly early or late in the day when the insects are inside the protective

tent. Pruning to remove the tent is also effective. Sanitary removal of diseased plant parts is an effective mechanical control method, particularly useful for anthracnose in blackberries.

Insect traps, vacuuming, sound devices and shooting may be useful, the latter two being mainly for birds and rodents. Rubber snakes, fake owls and other visual deterrents will often repel birds from maturing fruits such as figs, berries and pecans. Electric ultraviolet light traps which attract and kill various flying insects are effective against some fruit and nut pests, but would be limited to small orchards. Diatomaceous earth and various rock powders may be partly effective against some pests.

Pheromones and other semiochemicals can be used in traps in the orchard to manipulate pests, particularly as attractants, repellents or disruptors of normal life cycles. For example, sex pheromones readily lure the opposite sex of a species to its death, effectively reducing that part of the breeding population.

## Natural Pesticides

Inevitably, some pests on some fruits in some seasons simply experience rapid population increases, thus requiring quick and effective control measures to avoid substantial plant or crop damage. There are, however, few materials that can be used, including herbal or plant-derived controls such as pureed pepper or pureed garlic, pureed arthropods and insecticidal soaps. Expect only limited control of pests.

Dormant oil spray is considered organic, which would certainly help reduce overwintering populations of some pests in deciduous fruits. It is assumed that summer oils used in citrus would also qualify as organic, thereby providing an excellent control for scales, mites and greasy spot disease in citrus orchards.

All botanical pesticides, including rotenone, sabadilla, pyrethrum, quassia and ryania can only be used in a certified organic orchard by written approval of TDA. The same is true of copper-based and sulfur-based fungicides, including elemental sulfur. Use of diluted chlorine bleach as a disinfectant and micronutrients such as zinc is also subject to TDA approval.

## Integrated Pest Management

A completely integrated program of pest management is essential to organic fruit production. The grower must knowledgeably apply sound horticultural principles and sound pest prevention efforts. The grower must recognize both the pests and any beneficials in the orchard and monitor their populations on a routine and regular basis. A successful grower must be able to predict the effect of any current and/or pending weather upon population levels of pests and beneficials. When all other efforts are on the verge of failure, the grower must recognize the economic damage threshold level and take necessary steps to minimize losses by implementing active, direct pest control efforts as described above.

## Post-Harvest Handling and Processing

**I**t is beyond the scope of this publication to detail post-harvest handling, processing or marketing. Obviously, proper harvesting and handling of mature fruit is essential to assure quality. Rough harvesting and handling cause bruises which are invariably

attacked by rot organisms, rendering the fruit unmarketable. Sanitized containers and post-harvest facilities, prompt refrigeration (if required), and speedy marketing are essential.

A grower should expand his market to include processed products,

as processing can make use of fruits that are not marketable fresh because of bruises, pest damage or rots. Obviously, the processor would have to use hand labor to discern and remove such damaged parts of the fruit in order to salvage the unaffected portions.

## Texas Organic Certification Program

**T**he Texas Department of Agriculture established regulations and published standards for the certification of organically-produced food (non-livestock) from production through retail sale. The Organic Food Standards and Certification were published in the Texas Register, June 3, 1988. All synthetic pesticides, chemical fertilizers and artificial ingredients are completely eliminated in production, handling, processing and marketing of produce. The TDA program prohibits the use of virtually all organic pesticides as well.

The program is voluntary. Compliance is assured through annual

and spot inspections; soil, water and tissue testing; affidavits; and recordkeeping requirements of the regulations.

There are two levels of certification. Full organic certification is applied to commodities raised on land that has been free of synthetic pesticides for 3 years and synthetic fertilizers for 2 years. Crops meeting all standards except the time limits are classified as transitional until the time limits are met. Each certification level has an identifying logo, which may be obtained only from a list of TDA-approved printers. The logos can only be used ac-

cording to regulations set forth by TDA.

Basically, the standards classify all practices and materials used in farming as permitted, prohibited or regulated. The first two need no amplification; regulated means that a producer may use temporarily, usually only upon justification and approval by TDA, certain regulated practices or materials. These regulated procedures may vary across the state.

Complete discussion of the certification standards is in Organic Food Standards and Certification, available from TDA.

## Major Nutritional, Pest and Disease Problems

**T**his section presents major nutritional, pest and disease problems of fruits and nuts — problems which may be seriously limiting to organic production in some parts of the state in some seasons. A rating of each fruit's organic production potential follows. *This rating refers **only** to the relative ease of production by*

*organic means —and then only in those areas where the particular plant is adapted.*

For example, banana has a very high organic production potential because it is relatively free of pests and disease. However, the banana plant is highly sensitive to frost, so it is climatically limited to only a relatively small area of

deep South Texas. Even there, frosts can severely restrict production in many seasons.

To determine whether a fruit or nut is climatically adapted to a particular area of the state, consult with local county Extension personnel and other Extension publications.

# Major Problems and Production Potential

- Agarita** Agarita has no chronically serious pest or disease problems. Black stem rust of wheat can cause crop loss but its incidence can be reduced by elimination of small grains and winter grasses near the production area. Spring frosts can reduce production. Bird predation on the maturing berries can be significant.  
*Organic production potential: Very high.*
- Almond** Almond has fewer insect problems than peaches, but brown rot is a major fruit problem. Major nutritional deficiencies of iron and zinc occur on alkaline soils, but own-rooted almonds tolerate alkaline soils well. Early bloom consistently results in poor fruit set. Almonds are not well-adapted in Texas.  
*Organic production potential: Low to moderate.*
- Apple** Fire blight is a major disease affecting apple tree health, and cotton root rot losses can be quite severe. Codling moth is a major pest in North Texas. Black rot and bitter rot can cause serious crop damage, especially in more humid areas.  
*Organic production potential: Moderate.*
- Apricot** Brown rot and bacterial spot are major fruit diseases; other diseases, insect pests and nutritional problems are the same as PEACH. Cropping consistency is poor in more humid areas, but more consistent in West Texas. Seedling trees are better adapted and more consistent than budded trees.  
*Organic production potential: Low to moderate.*
- Avocado** No major insect pests are known in Texas. Spider mite damage to foliage may occur in some seasons. Anthracnose and scab severely affect fruit of thin-skinned Mexican-race avocados, but pose no problems for 'Lula'. Salt-induced chlorosis and necrosis of foliage common to Mexican-race avocados are largely avoided by using 'Lula' or other West Indian seedlings as rootstocks.  
*Organic production potential: Very high.*
- Banana** No major insect or disease problems are common in Texas.  
*Organic production potential: Very high.*
- Blackberry** Thrips, stink bugs and strawberry weevil can become serious on flowers or fruit; leaves are often affected by spider mites. Rosette (double blossom), anthracnose, septoria and cercospora leaf spots can be moderate to severe in humid areas, less so in drier climates. Proper pruning after harvest, elimination of all weed growth and selective removal of diseased (double blossom) canes will minimize problems. Erect varieties have better disease resistance. Iron chlorosis in alkaline soils can become limiting.  
*Organic production potential: Moderate to high.*

Each fruit's rating refers only to the relative ease of production by organic means — and then only in those areas where the particular plant is adapted.

## Major Problems and Production Potential (continued)

### Blueberry

Blueberry bud mite, blueberry maggot, cranberry fruitworm and other pests can cause minor to severe damage in some seasons. Prompt removal of old canes, plus many naturally occurring predators and parasites, keep most pests from having significant impact in most seasons. Alternaria leafspot, anthracnose, Botrytis, rust and other leaf spots have affected growth, flowering and fruiting. Good sanitation, complete weed control and proper irrigation and drainage are essential to minimize losses. Salt, particularly sodium, is detrimental. Nutritional problems are minimal if soil pH is maintained at 4.5 to 5.2.

*Organic production potential: Moderate to high.*

### Chestnut

Chestnut blight is still a major threat to all but resistant varieties. The chestnut gall wasp is a frequent problem. Little is currently known of other potential problems, as only a few varieties of blight-resistant chestnuts have begun to be planted. Micronutrient deficiencies can be expected on alkaline soils.

*Organic production potential: Moderate to high.*

### Cherry

Sweet cherries are not known to be adapted in Texas. Sour cherries have been grown at elevations above 3,000 feet. The bush or thicket cherries will produce in North Texas.

*Organic production potential: Moderate to high.*

### Citrus

Sucking insects and mites, including scales, aphids and blackfly, can limit production because of adverse effects on growth and development of twigs, leaves and fruit. Most are under partial biological control. Melanose deforms leaves and causes partial defoliation of grapefruit; greasy spot causes extensive defoliation. Foot rot kills trees, but is easily precluded by high budding and proper planting in well-drained sites. Virus diseases are excluded from Texas by quarantines against citrus plant materials from other areas.

*Organic production potential: High.*

### Date

There are no major pests or nutritional problems. Lethal yellowing (lethal decline) is killing all date palms in the Valley, but clean stock isolated in more arid areas of non-coastal South Texas could escape this disease. Date palms rarely produce quality dates because of inadequate pollination and high humidity.

*Organic production potential: Very high.*

### Feijoa

Fruit is virtually free of major pests, diseases and nutritional problems. However, high humidity induces fruit splitting and/or failure to ripen properly.

*Organic production potential: Very high.*

*Each fruit's rating refers only to the relative ease of production by organic means — and then only in those areas where the particular plant is adapted.*



## Major Problems and Production Potential (continued)

- Fig** The dried fruit beetle enters the eye of maturing fruit and causes souring, but closed-eye varieties and earlier harvest reduce losses significantly. Bird predation of maturing fruit can be extensive. Fig leaf rust causes extensive defoliation in late summer, particularly in humid areas.  
*Organic production potential: High to very high.*
- Filbert** Pest and disease problems of filbert have not been reported in Texas. However, production has not occurred in Texas because of poor adaptability to high spring and summer temperatures.  
*Organic production potential: Very high.*
- Grape, Muscadine** Muscadine grapes prefer acidic soils. There are few pests or diseases that are limiting, although black rot can cause crop damage.  
*Organic production potential: High to very high.*
- Grape, Mustang** There are no major limiting problems to the production of this Texas native wild grape. Grape leaffolder can cause extensive defoliation in some seasons, but is rarely debilitating to the vine.  
*Organic production potential: Very high.*
- Grape, Varietal** American types are fairly resistant to serious diseases; grape leaffolder can be damaging in some seasons.  
*Organic production potential: High*
- French-American hybrids have some tolerance to Pierce's disease, but black rot is a limiting factor, and mildew can be serious. Grape leaffolder and grape berry moth can be serious pests in some seasons.  
*Organic production potential: Low to moderate.*
- Vinifera grapes are seriously affected by black rot, Pierce's disease, mildew, and grape berry moth.  
*Organic production potential: Very low.*
- Guava** There are no limiting problems in adapted climates of South Texas.  
*Organic production potential: Very high.*
- Jujube** There are no limiting pest or disease problems of jujube in Texas. Rootsprouts are extensive.  
*Organic production potential: Very high.*

Each fruit's rating refers only to the relative ease of production by organic means – and then only in those areas where the particular plant is adapted.

## Major Problems and Production Potential (continued)

- Kiwifruit**      Kiwifruit is seriously limited by cotton root rot and hot temperatures during spring and summer. To date, most attempts to grow kiwifruit have ended with vine death within a few months of planting, so kiwifruit has not been reported to fruit under natural conditions in Texas.  
*Organic production potential: Low.*
- Loquat**      The only limiting factors are susceptibility to fire blight and occasional crop failure following very cold winters, i.e., temperatures below 24° to 25°.  
*Organic production potential: High to very high.*
- Mango**      There are no major pests, although scales and whiteflies can affect growth and production. Anthracnose affects all stages of fruit production, particularly during humid seasons.  
*Organic production potential: High.*
- Mayhaw**      Mayhaw is subject to many of the same pests that attack other pome fruits, but none are considered seriously limiting to production. Both quince rust and hawthorne rust can be severe, but removal of alternate, evergreen hosts should reduce the problem.  
*Organic production potential: High to very high.*
- Mulberry**      Bird predation of mature fruit and Cercospora leaf spot are the only serious problems affecting mulberry.  
*Organic production potential: Very high.*
- Nectarine**      Nectarines are seriously affected by the same pests and diseases as PEACH.  
*Organic production potential: Very low to low.*
- Olive**      There are no limiting pests or diseases, but olive has rarely fruited in Texas.  
*Organic production potential: High to very high.*
- Papaya**      Cotton root rot and virus diseases can limit papaya life and productivity. No significant pests occur. Postharvest fruit rots can be alleviated by more careful handling. Anthracnose can be serious in wet, humid seasons.  
*Organic production potential: High to very high.*
- Peach**      Catfacing and scale insects are serious pests of peach. Limiting diseases include brown rot, leaf rust, cotton root rot, bacterial spot and others. Both zinc and iron deficiencies exist in alkaline soils.  
*Organic production potential: Very low.*

*Each fruit's rating refers only to the relative ease of production by organic means — and then only in those areas where the particular plant is adapted.*

## Major Problems and Production Potential (continued)

- Pear** Fire blight is a major limitation to susceptible varieties. Codling moth can be serious in North Texas, as can various scale insects, in some seasons.  
*Organic production potential: High.*
- Pecan, Improved** Improved pecans have major pest and disease problems except in arid Far West Texas. Pecan scab is the major disease, but downy spot, stem end blight and several other diseases can be limiting. Major insect pests include pecan nut case-bearer, hickory shuckworm, pecan weevil and aphids.  
  
Less serious pests include stinkbugs, mites, phylloxera, webworm and walnut caterpillar. Zinc deficiency is a major nutritional problem throughout the pecan belt.  
*Organic production potential: Low.*
- Pecan, Native** The same problems that affect improved pecan also affect native pecan, although native pecan has generally better scab resistance and can obtain some zinc nutrition from the soil. Pecan weevil is probably most damaging, but its cycle generally corresponds well with alternate bearing tendencies of native pecan trees.  
*Organic production potential: Moderate to high.*
- Persimmon** Both native and Japanese persimmons are virtually free of pest and disease problems. Scale insects may pose occasional problems.  
*Organic production potential: Very high.*
- Pistachio** Pests and diseases are not a serious problem, but several are considered of minor significance, including thrips, stinkbugs, scales, aphids, mites, verticillium wilt and cotton root rot. Pistachio is best adapted to the more arid regions of the state.  
*Organic production potential: High.*
- Plum** Both native and varietal plums are subject to most of the same pests and diseases as PEACH, although wild plums often exhibit greater resistance or tolerance.  
*Organic production potential: Low to moderate.*
- Pomegranate** There are essentially no limiting pests or diseases, although fruit spots can be serious in humid areas. Fruit splitting near maturity occurs because of poor water relations. Plants tolerate alkaline and somewhat saline soils quite well.  
*Organic production potential: Very high.*

*Each fruit's rating refers only to the relative ease of production by organic means — and then only in those areas where the particular plant is adapted.*

## Major Problems and Production Potential (continued)

**Quince** Quince is subject to the same pests and diseases as PEAR, but only fire blight is considered serious.

*Organic production potential: High.*

**Raspberry** The same pest and disease problems that affect BLACKBERRY affect raspberry, although rosette (double blossom) has not been reported in Texas. The red varieties have more resistance and are better adapted to Texas.

*Organic production potential: Moderate to high.*

**Strawberry** A number of foliar diseases affect strawberry plants, but do not normally achieve great significance. Root diseases are avoided by the use of resistant varieties. Fruit rot, particularly gray mold, can be serious, but incidence is reduced by sanitation and wider plant spacing. Various insects, especially strawberry weevil, can become damaging in some seasons, but most are of only minor significance.

*Organic production potential: Moderate to high.*

**Walnut, Black** Anthracnose is the most serious disease of black walnuts, particularly during humid, rainy weather. Some seedlings and varieties are somewhat resistant. There are no significant pests.

*Organic production potential: Very high.*

**Walnut, English** Anthracnose and bacterial blight are major problems on non-resistant varieties. Insect pests include webworm, walnut caterpillar, codling moth, husk maggot (walnut husk fly) and others, but serious infestations have not generally occurred.

*Organic production potential: High.*

Each fruit's rating refers only to the relative ease of production by organic means—and then only in those areas where the particular plant is adapted.



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10M-12-91, New

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