

Crop Profile for Persimmons in California

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General Production Information

- The total value of California's persimmon crop in 1998 was \$12,614,300. In 1998, 11,439 tons were produced on 2,165 acres (1).
- Tulare County leads California persimmon production with 4,830 tons harvested from 715 acres in 1998. The average yield per acre was 6.76 tons priced at \$1,150 per ton (1).
- China leads in the worldwide production of persimmons, producing around 57% of the crop. Japan is second, producing 27% of the crop (6).
- California makes up 99% of national market (6).

Production Regions

The central San Joaquin Valley of California is the major production area with Tulare and Fresno Counties producing 53% of the state's total production. Other production areas are located in southern California around San Diego, Riverside, and Orange counties. A small percentage of the total acreage is grown in the northern counties of Sutter and Placer counties.

Persimmons grow best in regions with moderate winters and relatively mild summers. When fully dormant the persimmon tree can tolerate temperatures of 0°F. However, since the tree has a low chilling requirement, it may break dormancy early and be damaged by spring frosts. Persimmons do not produce well in the high summer heat of desert regions (2). In California the leading production counties are Tulare, San Diego and Fresno (1).

Production Practices

The persimmon is also known as the Oriental persimmon, Japanese persimmon, or kaki. It is native to China and was introduced to California in the mid-1800's. The persimmon tree is either male or female, but some trees have both male and female flowers. Many cultivars set seedless fruit without pollination, but some climates require pollination for adequate production (2). Cross-pollination can be a problem when 'Hachiya' and 'Fuyu' persimmon are planted within one-half mile of each other. Hard black seeds will develop in the 'Fuyu' fruit making it non-marketable.

Persimmon fruit is classified as either astringent or non-astringent. An astringent cultivar must be jelly soft before it is edible, whereas, a nonastringent cultivar can be eaten when it is crisp. Cultivars within each category may be influenced by pollination or unaffected by pollination. Non-astringent cultivars that are influenced by pollination are edible when firm only if they have been pollinated. Astringent cultivars are best adapted to cooler regions and non-astringent cultivars do best in areas with hot summers. The most important cultivars are 'Hiratanenashi', 'Hachiya', 'Tanenashi', 'Triumph', 'Kaki Tipo', and 'Rojo Brillante' (astringent); 'Fuyu', 'Jiro', 'Hana-Fuyu', and 'Gosho' (non-astringent) (2, 6).

Persimmons can be grown in a wide range of soils, but do best in well-drained loam. The tree does not tolerate salinity. Persimmons grow better in heavier soils than do most other deciduous tree fruits. Persimmons are sensitive to boron and salts in the soil. Persimmon is a drought tolerant crop; however, regular irrigation is required for best production and tree maintenance. Fruit will be larger and of better quality if regularly watered. Irrigation is added from spring through fall to provide trees with a total of 36 to 48 inches of water annually. Both furrow irrigation and micro-sprinklers are common. Trees do well with a minimal amount of fertilizer. If necessary, a balanced fertilizer is applied in late winter or early spring (2, 6).

Trees are pruned to develop a strong framework to support the heavy fruit. They reach full bearing in 7-10 years. Propagation is by budding or grafting onto seedling rootstocks (2, 6).

Fruit is normally harvested from late September to early December for the fresh market or for drying (5, 6).

Diospyros lotus is the primary rootstock used in California persimmon orchards. This rootstock is adapted to a wide variety of soil types and tolerates the high moisture content found in many heavy soils containing hard pan. It produces uniform seedlings and rarely produces suckers. Other rootstocks occasionally found include *D. kaki*, which has a long taproot and is sometimes found in the oldest orchards and *D. virginiana*, which suckers badly and grows non-uniform trees. Orchard spacing is determined by the variety selected (3). Both 'Fuyu' and 'Jiro' can be planted 16' X 16', 16" X 18' or closer in sandy soils. 'Hachiya' is a larger tree requiring a spacing of 24' X 24' or 20' X 20' in sandy soils. Tree training is either an open vase style or a modified central leader style. 'Hachiya' is generally trained to a modified central leader while many 'Fuyu' and 'Jiro' orchards use an open vase system. In heavy set years or if the trees are poorly pruned limb propping may be required to prevent limb breakage. Encircling the tree canopy with tree rope is a normal practice to prevent limb breakage and to maintain the tree shape. The 'Hachiya' variety tend to over set fruit and both pruning and fruit thinning are required to prevent limb breakage and to promote larger fruit size. Pruning and flower or fruit thinning help prevent persimmons from becoming alternate bearing (4). Persimmon trees do not come into full bearing until they are about ten years of age. 'Early Fuyu' are harvested during the first week of September and 'Hachiya' is harvested the last week of September in normal years. In general, supplemental fertilization with nitrogen is required at a rate of 2 ounces per year of tree age per tree. Persimmons are classified as either astringent or non-astringent. Each group of persimmons are further sub-classified as either pollination constant, which means that the flesh remains light colored after

pollination or they are pollination variant, which means that the flesh color is light colored when seedless but the flesh color turns reddish brown when pollinated and seeds are present (4). "In astringent types (both pollination variant and pollination constant), water-soluble tannins which cause astringency in the flesh decrease as the fruit softens and becomes edible" (4). "In pollination variant, non-astringent types, the soluble tannins disappear after pollination if enough seeds (usually four or five) form. However, if only one or two seeds are formed, some parts of the fruit will remain astringent. In pollination constant, non-astringent types, the fruit is edible when the flesh is firm but mature, regardless of whether or not pollination has occurred" (4).

Pesticide Data

Label rates, re-entry intervals and pre-harvest intervals for all chemicals listed in this document are from labels. Many of the labels are contained in the Crop Protection Reference (3) or at <http://www.cdms.net/manuf/manufac.asp>. Percent of acres treated, average number of applications, median application rate, and total lb a.i. applied are from the 1997 California Department of Pesticide Regulation 100% Reporting database (4).

Insect Pests

Persimmons are relatively free of pests and diseases. Mealybugs and scale in association with ants can sometimes cause problems. Ant control is the best method to control these pests. Occasional pests include white flies, thrips and a mite that is blamed for the brown lace collar near the calyx (2, 6).

Control

Non-Chemical:

The only non-chemical control for ants is Tanglefoot or Stickum.

Chemical:

- *Bacillus thuringiensis* – Label rates vary by formulation. 4-hour REI. 0-day PHI. In 1997, 0.41 lb a.i. was applied to 0.2 acres of persimmons 2 times at a median application rate of 0.7 lb a.i./acre (4).

- **Pyrethrins/Rotenone** – 4-hour REI. In 1997, 0.1 lb pyrethrins and 0.09 lb rotenone were applied to 1% of the persimmon acreage 1 time at a median application rate of 0.01 lb a.i./acre (4).

Diseases

In California, pathogens reported on persimmon are *Agrobacterium tumefaciens*, *Phytophthora* sp., *Armillaria mellea*, *Botrytis cinerea*, *Cladosporium* sp., *Phoma diospyri*, and *Viscum album*, *Verticillium* wilt and *Botrytisphaeria* canker. Physiological problems include cracks radiating from the calyx, sunburn, post-flowering fruit drop, and alternate bearing (5, 6).

Controls

No chemicals for disease control of persimmons are registered for use in California.

Weeds

Weeds are a typical problem especially during the first two years after planting an orchard. When the canopy closes and shades out the middles, weed growth is usually reduced. Generally, there is one preemergent application made on the berm surrounding the trees. The preemergence herbicide is usually applied in the fall following harvest or is applied in the winter or spring. Weeds in the row middles are generally controlled with repeated post emergent applications, alone or in combination with cultivation. The spectrum of weeds within an orchard changes so much that loss of the broad spectrum herbicides (glyphosate and paraquat) would cause the loss of post emergent weed control in orchards. It would also cause the loss of effective control of perennial weeds.

Control

Non-Chemical:

Cultivation.

Chemical:

- **Glyphosate** – Label has a rate of 1.0-5.0 lbs a.i./acre and a 12-hour REI. 14-day PHI. In 1997,

2,041 lbs a.i. were applied to 81% of the persimmon acreage 2 times at a median application rate of 0.94 lb a.i./acre (4).

- **Napropamide** – Label has a rate of 4.0 lbs a.i./acre and a 12-hour REI. 35-day PHI. In 1997, 189 lbs a.i. were applied to 17% of the persimmon acreage 1 time at a median application rate of 1 lb a.i./acre (4).
- **Oxyfluorfen** – Label has a rate of 0.5-2.0 lbs a.i./acre (postemergence) and 1.25-2.0 lbs a.i./acre (preemergence) and a 24-hour REI. Oxyfluorfen may be applied from final harvest up to February 15 (February 1 in the Coachella Valley). In 1997, 178 lbs a.i. were applied to 27% of the persimmon acreage 1 time at a median application rate of 0.51 lb a.i./acre (4).

Vertebrate Pests

Vertebrate pests of persimmon include squirrels, deer, coyote, rats, opossums, birds and gophers. Most of the pests are interested in the fruit; however, gophers attack the roots.

Controls

Chemical:

- **Aluminum phosphide** – In 1997, 2 lbs a.i. were applied to 1.6% of the persimmon acreage 1 time at a median application rate of 0.04 lb a.i./acre (4).
- **Chlorophacinone** (0.005% bait) – In 1997, 0 lb a.i. was applied to 9 persimmon acres 1 time (4).
- **Strychnine** (0.5% bait) – In 1997, 0.08 lb a.i. was applied to 0.8% of the persimmon acreage 2 times (4).
- **Zinc phosphide** (2% bait) – In 1997, 1 lb a.i. was applied to 0.8% of the persimmon acreage 1 time at a median application rate of 0.1 lb a.i./acre (4).

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