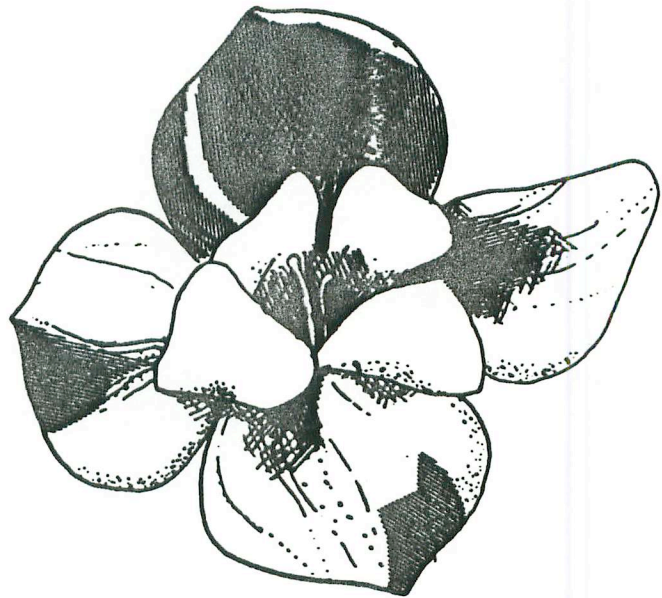


GROWING PERSIMMONS



Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

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GROWING PERSIMMONS IN CALIFORNIA

INTRODUCTION

Oriental persimmons can be grown in many areas of California. At one time they were widely grown commercially in southern California, but commercial production is now largely confined to the the San Joaquin and Sacramento Valleys. As an ornamental or yard tree the Oriental persimmon is prized for its fruit, which matures in October and November, and its freedom from pests and diseases.

The Oriental or Japanese persimmon (*Diospyros kaki*) has been grown widely in China and Japan for centuries. A member of the Ebenaceae family, it is related to other persimmon species including *D. lotus* and *D. virginiana* (native American persimmon) which are used for rootstocks. Certain species in tropical Asia and Africa furnish ebony wood.

The best Japanese and a few Chinese varieties were introduced as grafted nursery trees between 1870 and 1920 by the United States Department of Agriculture, the University of California, and commercial growers. Out of more than 500 introductions only a few varieties are presently marketed.

Virtually all persimmon fruit sold in the U.S. is grown in California. In 1981, there

were about 700 acres in California, although the average in the 1930's and 1940's reached 2,000 acres. Statewide yields average about 5 tons per acre and individual trees have been known to produce up to 400 pounds of marketable fruit.

With satisfactory cultural conditions, a persimmon orchard may come into commercial production by the fifth or sixth year. Full production is seldom attained until the tenth year. Development costs may be amortized by the end of the tenth year if cultural conditions are favorable.

The characteristic astringency of unripe persimmons is caused by soluble tannin in the flesh. This astringency disappears in most varieties when the fruit ripens and softens; in others it disappears when the flower is pollinated and the fruit becomes seedy. In Fuyu and a few other nonastringent varieties, the flesh is edible when mature and firm.

Hachiya variety, a seedless astringent type, is picked when mature and firm, but must be allowed to soften before astringency disappears, after which the fruit may be eaten.

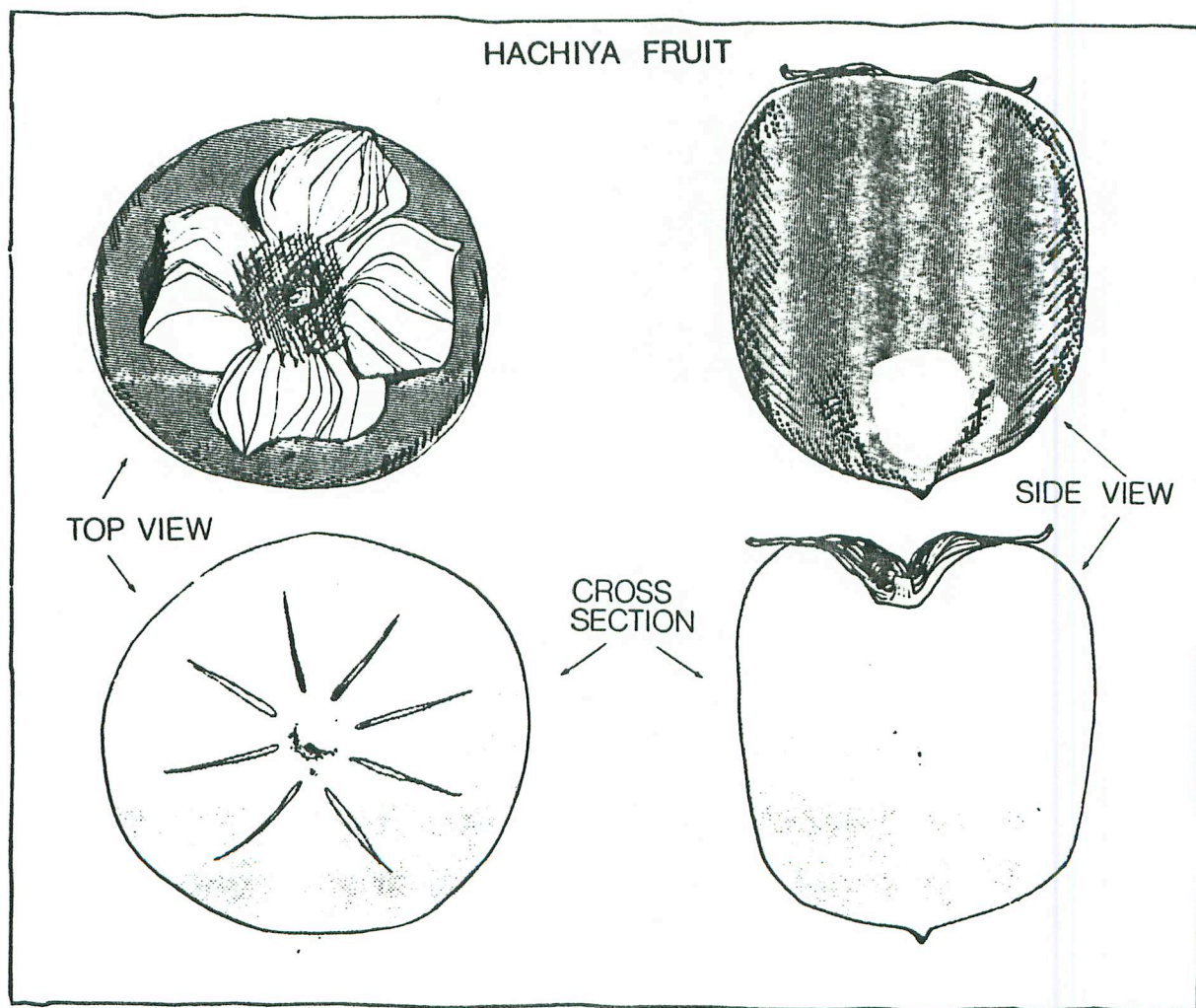
COMMERCIAL VARIETIES

Hachiya is by far the most desirable and popular variety grown in California and accounts for about 90 percent of the existing acreage. Most of the remaining acreage is made up of nonstringent Fuyu, plus some specimen plantings of several different varieties.

Hachiya fruit is large, oblong, conical (acorn shaped), and deep orange red. Properly handled it ripens uniformly and is usually seedless with an attractive, clear golden orange flesh. It brings the best price on the fresh-fruit market.

Hachiya trees may produce light crops in some areas, especially when young. When pollinated, black areas appear in the flesh around the seed. As this gives cut fruits an undesirable appearance, the Hachiya variety should be planted in solid blocks without pollinators. The flowers will generally set good crops parthenocarpically (without pollination) and produce seedless fruit.

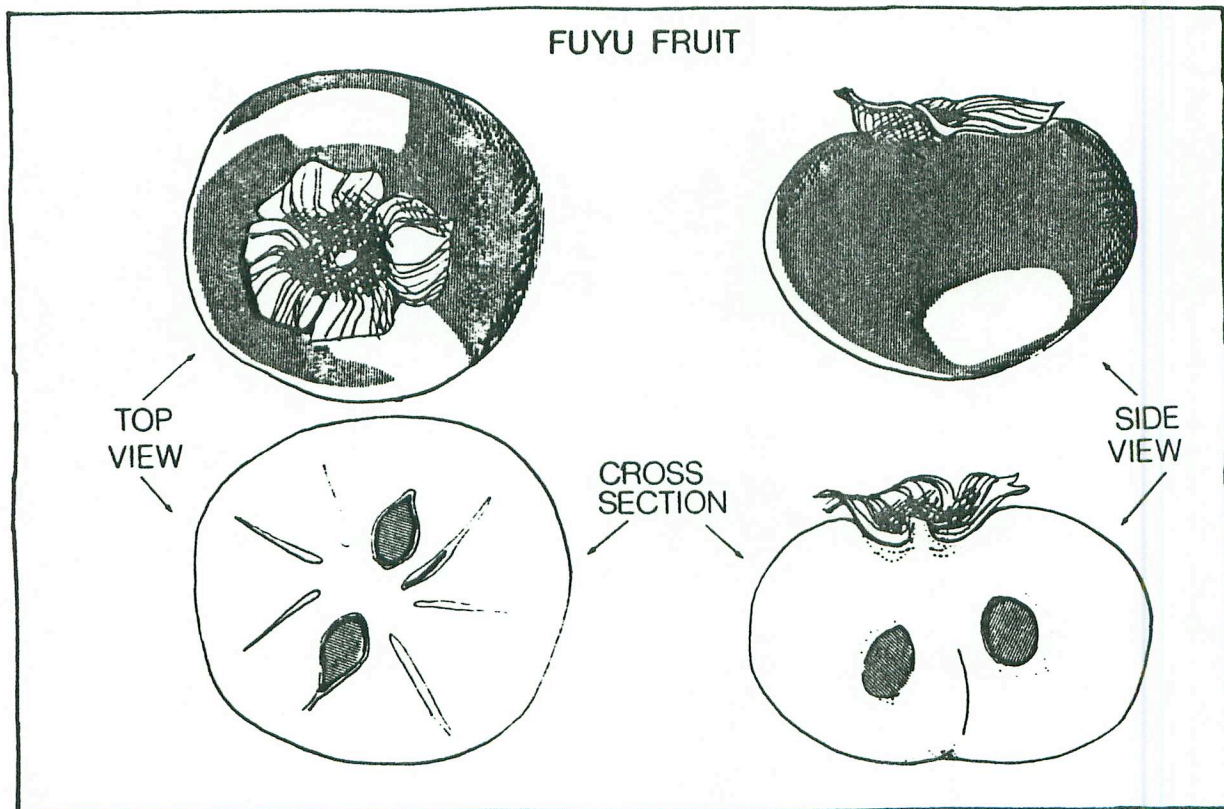
The Hachiya tree is the best growing of major commercial varieties. With careful training it develops a structurally strong top capable of bearing a tremendous load of fruit.



Fuyu fruit is flat and nearly round with an orange-red color. The flesh is firm and nonastringent with a pleasing flavor. Fuyu produces only female flowers fruiting without pollination. If another variety producing male flowers is present some of the fruit will be seedy. Leaves of the Fuyu tree are a distinctive yellow color in the spring.

Fruit of the Giant Fuyu tends to be larger than the older selection of Fuyu. The tree is a good bearer and has an upright, vigorous growth habit making it easy to train and maintain.

Other varieties are of interest but not important commercially. Hyakume is an orange colored, medium size, late maturing fruit and generally has chocolate or cinnamon colored flesh resulting from pollination. Maru includes several cultivated varieties that produce round orange-colored fruits which have sweet chocolate-colored flesh. Tamopan is a large, astringent, thick skinned, orange colored, late ripening persimmon with a characteristic constriction around the center of the fruit. Tanenashi is a large orange colored fruit resembling the Hachiya but with inferior flavor and mealy texture.



CLIMATE

The Oriental persimmon grows and produces well in both subtropical and temperate areas of California including southern California, the Central Valley and the San Francisco Bay area. It produces well in the hot Sacramento and San Joaquin Valleys and adjacent foothills as well as in the milder, more humid coastal sections of central and southern California.

The persimmon does not require the winter chilling needed by most deciduous fruits, and blooms late enough in April to miss spring frosts in most areas. Large mature trees can tolerate winter temperatures as low as 10° F.

SOILS AND IRRIGATION

Persimmons grow well on a wide range of soils. Although they grow better on heavy clay soils than most other fruit trees, they grow and produce best on deep, fertile, medium textured, well drained soils. Persimmons are about as sensitive as walnuts to excess salinity and boron.

Although persimmon trees withstand considerable drought, fruit size and yield suffer if there is insufficient moisture during the growing season. Satisfactory fruit set and adequate early shoot growth require that ample moisture be present in the soil before spring growth. For maximum fruit size, continued tree growth, and ample foliage development, adequate soil moisture must be maintained by irrigation throughout the entire growing season. A total of 36 to 48 inches of irrigation water in addition to rainfall is needed to produce a good persimmon crop.

Root injury may result if the soil remains

saturated during the growing season. When grown on *D. lotus* rootstock, persimmons tolerate excessive soil moisture better than most other deciduous fruit trees. Persimmons tolerate hard-pan soils better than most trees but crop and tree size will be limited.

ROOTSTOCKS

The three *Diospyros* species grown in California have also been used as rootstocks for the Oriental persimmon varieties.

D. lotus is now the most widely used persimmon rootstock in California. It produces uniform seedlings and rarely produces suckers. Trees grown on *D. lotus* are thrifty and adaptable to a wide range of soil conditions. It is compatible with most commercial varieties.

D. kaki seedlings produce long taproots with few fibrous laterals and the oldest orchards in California are propagated on this species. Seed taken from seedy varieties known to produce uniform vigorous seedlings provide the most desirable source for rootstock propagation.

Seedlings of *D. virginiana* have good fibrous root systems that tolerate both drought and excess moisture. Unfortunately, trees propagated on this stock have not been uniform in size and vigor, and the rootstock suckers badly.

PROPAGATION

Seedlings may be grown from fresh seed although it is advisable to sow in the fall or stratify at 45° to 50° F for 60 to 90 days. After stratification they can be ger-

minated in boxes in a greenhouse held at about 70° F. Germination of seeds is not high, with 25 to 35 percent germination being common. The seedlings are then lined out in the nursery row during spring, when soil temperature is 55° F or higher. Care must be taken to prevent loss of roots from drying or rough handling. Transplanted seedlings must be shaded until they become well established.

Seeds may be planted directly in the nursery row, but by using seed beds and transplanting when plants are 6 to 8 inches high a better lateral root system develops. Plants are set from 8 to 12 inches apart in the row, with rows spaced 3 to 3½ feet apart.

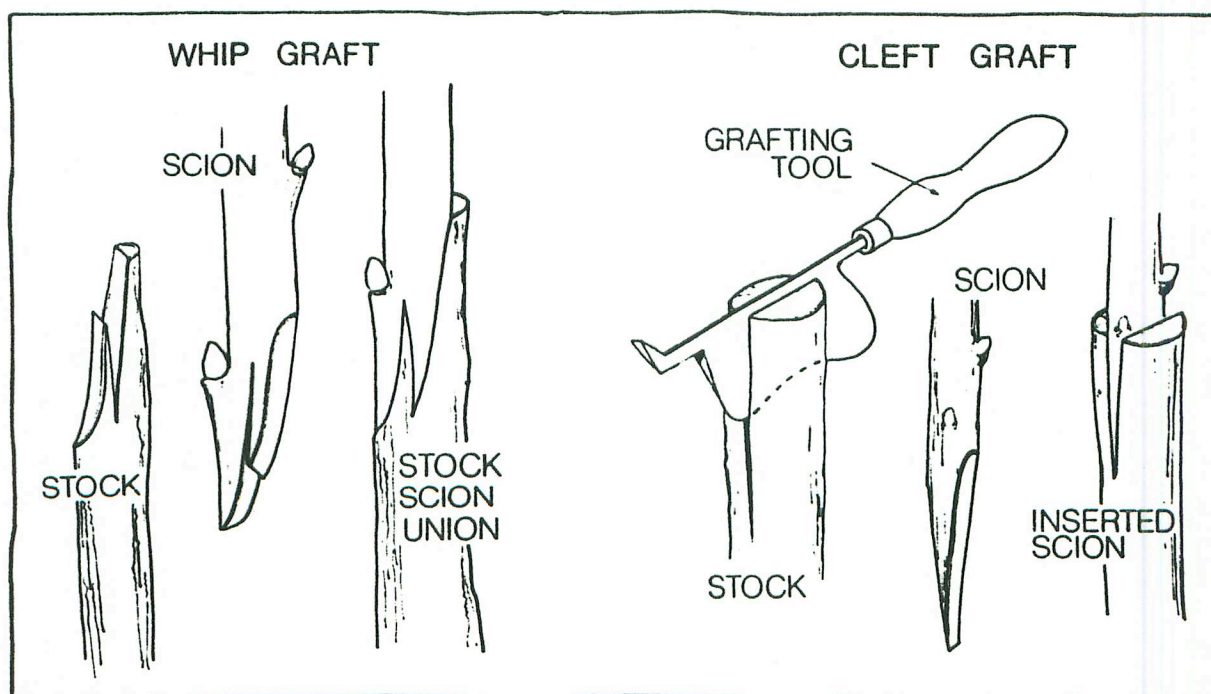
Seedlings usually attain sufficient size for budding or grafting at the end of a season's growth. Grafting is done when stock and scion are dormant. Scions taken from vigorous shoots of the previous season's growth should be ¼ to ⅜ inch in diameter and 3 to 5 inches long with 2 to 4 buds.

Whip grafting of small trees and cleft grafting of large ones give best results in topworking persimmon seedlings and trees. Some propagators have had good results bark grafting using stored scion wood. Budding gives variable results and is seldom done.

ORCHARD SPACING AND PLANTING

In shallow, less fertile soils, lower-vigor varieties such as Fuyu can be spaced as closely as 12 by 16 feet to obtain good yields without serious tree crowding. In deeper, well-drained soils Fuyu is best planted 15 to 18 feet apart. In contrast, the vigorous Hachiya is best at 24 by 24 feet to avoid crowding on deep soils, and 20 by 20 feet apart on shallow soils.

Because the persimmon tree has fragile roots it must be transplanted with care. Trees should be set in the field at the same depth they grew in the nursery row.



Roots must be protected against drying at all times. To insure good root contact with moist soil, trees should be irrigated immediately after planting.

FERTILIZATION

Persimmons respond to nitrogen fertilization. Mature trees require about 1 pound of nitrogen per year depending on the inherent fertility of the soil.

Phosphorus and potassium requirements are not high and most California soils are amply supplied with these macronutrients. Micronutrient deficiencies such as zinc may be corrected by foliar sprays in a manner similar to that used for stone fruits.

TRAINING AND PRUNING

Young trees are trained to develop a modified leader system with well spaced lateral branches. To establish an upright, structurally strong tree, especially in areas where there is wind or strong prevailing breezes, stake it with a stout 4- to 5-foot stake for the first 2 or 3 years. Develop 3 to 5 main limbs at about 1-foot intervals with the first limb about 3 to 4 feet above the ground. Pinching off (heading) vigorous shoot growth during the first and second growing seasons helps force the growth into the proper framework branches.

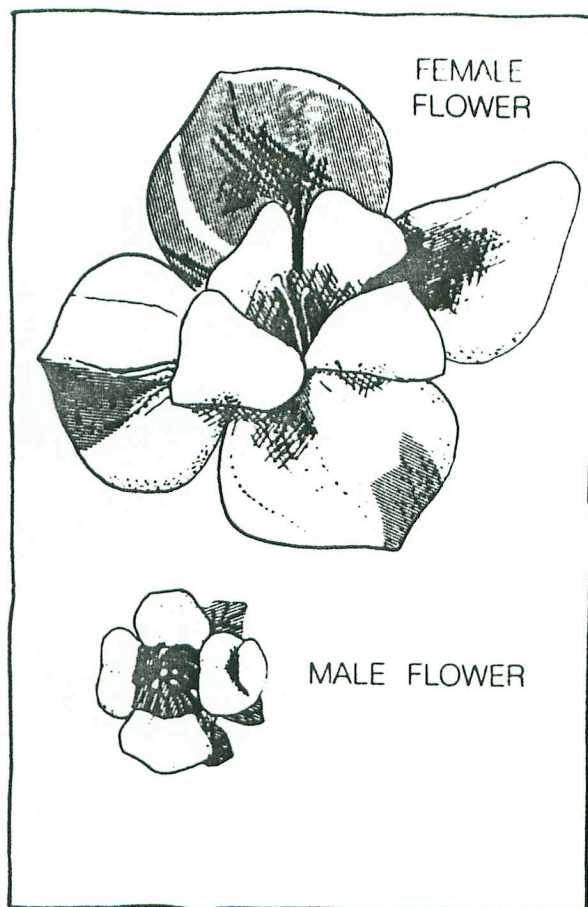
The pruning of mature trees should be light and confined mostly to small cuts to thin out weak shaded branches, or to head back excessively vigorous growth. If large saw cuts are needed, it usually indicates that training has been neglected. Cross-over, diseased, and broken limbs are removed during the annual winter pruning. Low branches in danger of breaking from

the weight of fruit should be pruned back or propping and tying may be necessary to prevent breakage.

Because flowers of *D. kaki* are borne on wood of the current season's growth, moderate pruning every year or two is desirable to stimulate moderate new growth. Vigorously growing young trees shed more fruit than do older ones with moderate growth, and heavy pruning causes long shoots that break when heavily cropped in future years. On the other hand, weak growing, lightly pruned trees do not mature good crops of acceptable market-sized fruit. Moderate annual pruning helps keep trees fruitful and structurally strong to support heavy crops.



Picking persimmons from a hydraulically operated man positioner.



PESTS AND DISEASES

The persimmon is relatively free from serious pests and diseases. Citrus mealybug, *Panococcus citri*, largely controlled by natural enemies, may at times be troublesome in southern California. Orange tortrix, *Argyrotaenia citrana*, occasionally attacks persimmon fruit in southern California but is of little consequence in the San Joaquin Valley. Sporadic infestations of the red-humped caterpillar, *Schizura concinna*, may defoliate persimmon trees. Olive scale, *Parlatoria oleae*, has also been found on persimmons but this pest is normally controlled by parasitic wasps.

Root-knot nematode is not a serious pest of persimmons. Citrus and other nematode species have been found on persimmon roots but apparently cause little

damage. Crown gall, caused by *Bacterium tumefaciens*, is the most troublesome disease of persimmon. Infections may be avoided by using disease-free nursery stock and preventing injuries to trunk or crown roots that may permit entrance of the bacteria. *Stem pitting* disease, probably of virus nature, has been observed on trees planted on *D. kaki* but not on *D. lotus*.

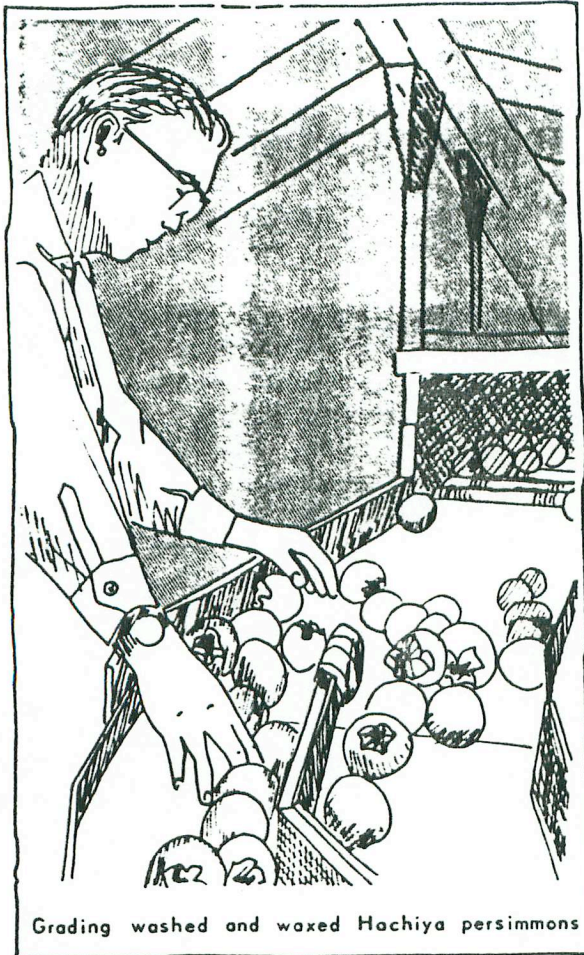
HARVESTING

Persimmons picked for the fresh-fruit market should be well matured and of characteristic color. Standards set by the California Agricultural Code require persimmons to attain a specified color before being marketed. Experience shows that firm fruit allowed to remain on the tree until they develop good color command the best prices and provide maximum consumer satisfaction. Fruit picked when still immature does not soften evenly and may remain partly astringent.

To harvest, the fruit is clipped leaving the calyx and a short stem attached to the fruit. Persimmons may be snapped, but this takes some skill and may cause fruit injury.

Careful handling minimizes bruising. Bruising causes brown spots which lower the grade. Using rigid containers such as picking buckets reduces fruit injury (as compared to picking in picking bags). Because of their pointed apex, Hachiya must receive special handling care. Field boxes or bins are used for transporting fruits from orchard to packinghouse.

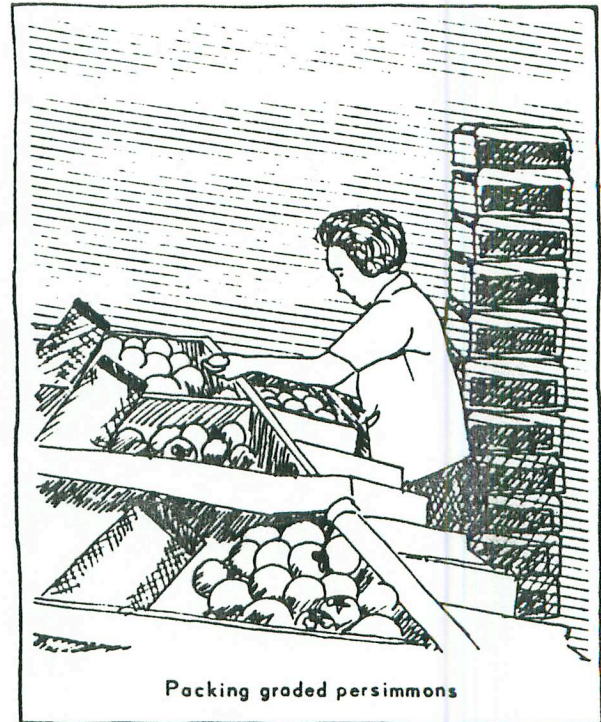
Harvesting of early-maturing varieties starts about September 25 and, with later varieties, continues to approximately December 10. The most active period is from October 10 to November 15.



PACKING

Persimmons are picked and packed when ripe but still firm. Care must be taken during the entire process to prevent bruising. Most persimmons are commonly packed in 1-layer lugs, although 2-layer lugs are sometimes used. Plastic tray packs are also used in both 1- and 2-layer boxes. Packers must conform to size and maturity standards adopted by the industry and stated in the Agricultural Code.

Markets usually require each box to show the name and address of the grower or packer, and the variety and count size.



MARKETING

About half of California's persimmon crop is shipped to local California markets, principally San Francisco and Los Angeles. The rest usually goes to eastern markets—New York, Philadelphia, and Chicago; a small portion goes to Hawaii. Many areas in the U.S. remain untapped potential markets for this delicious fruit.

UTILIZATION

Cold storage facilities enable growers to harvest Hachiya fruits at optimum maturity and hold them for orderly marketing. Consumers can keep persimmons in a cool place for a considerable time before use. They can also be frozen and held for a year or longer—before freezing they may be peeled, pureed and then frozen in tight containers. They also can be frozen whole in plastic bags and then thawed as needed.

When put in cold storage persimmons hold best at 32° F.

Besides being used fresh in salads, the persimmon may also be eaten as a dessert. Persimmons are widely utilized in cookies, breads, cakes, pies, ice cream, jams, and jellies.

Dried persimmons are commonly used in the Oriental diet. Fruits used for drying are harvested when ripe and firm. After being peeled and sun dried, they are stored at about 65° F and in a relative humidity of 50 to 60 percent. During storage or slow drying a surface covering of sugar crystals gradually appears, and this improves the appearance of the product. Dried persimmons contain a large amount of dextrose and are comparable to dried peaches in food value.

REMOVING ASTRINGENCY

When persimmons are picked ripe but still firm, they are sometimes slow to soften and lose astringency. This process may take 2 to 3 weeks at 70° F but can be speeded up by placing the fruit in a freezer for about 24 hours. When the persimmons are removed and thawed, they are both soft and free of astringency, and may be eaten fresh immediately or cooked.

Firm, ripe persimmons may be placed with an apple in a plastic bag or fruit-ripening bowl. Ethylene gas released by the apple speeds up the process of softening and astringency loss in persimmons.

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