HAWAII COOPERATIVE EXTENSION SERVICE
Hawaii Institute of Tropical Agriculture and Human Resources
University of Hawaii at Manoa
COMMODITY FACT SHEET PERS-3(A)
FRUIT

PERSIMMON

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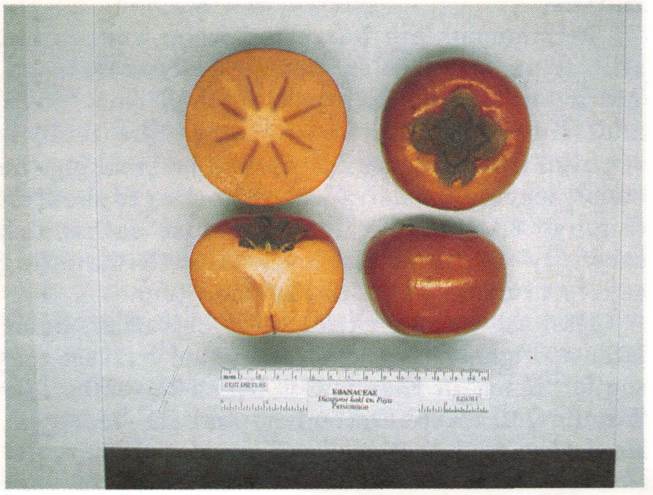

Figure 1. 'Fuyu' persimmon.

Figure 2. 'Fuyu' fruit cluster.

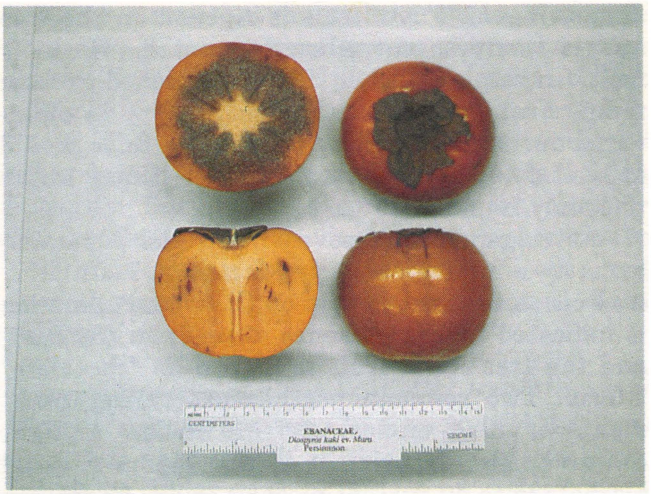

Figure 3. 'Maru' persimmon; internal discoloration, caused by curing, is normal.

Figure 4. 'Maru' fruit cluster.

Scientific Name: *Diospyros kaki*
Common Names: Persimmon, Japanese persimmon, kaki
Origin: Asia

Description

Persimmon is a dioecious, deciduous tree growing to 25 ft (7.6 m) high. Its ovate or obovate leaves, 3 in. to 7 in. (7.6–17.8 cm) long, are shiny on top and pubescent beneath and are borne on pubescent branchlets. Persimmon flowers are yellowish white and 0.75 in. (1.9 cm) long. Staminate (male) flowers have 16 to 24 stamens, while pistillate (female) flowers have eight staminodes. The fruit is a juicy berry to 3.5 in. (8.9 cm) in diameter and variable in shape, with a pale yellow, orange, or red exterior, and with orange flesh. There is an enlarged persistent calyx at its base. Fruits are usually set in clusters.

Varieties

Persimmon cultivars 'Fuyu', 'Maru', and 'Hachiya' (Figures 1–6) are grown in Hawaii. The shape of 'Fuyu' fruit is flattened, 'Maru' is rounded, and 'Hachiya' is heart-shaped and pointed at the apex. 'Fuyu' is the most widely planted cultivar in Japan and is noted for its nonastringent fruit, good yield, vigorous upright growth habit, and ease of training. 'Maru' has somewhat brittle branches, and the fruit is astringent, maturing about three weeks earlier than 'Fuyu'. 'Hachiya' fruit is also astringent before softening. These and most other cultivars bear only functionally female flowers (with stamens present but sterile) that without fertilization produce seedless (parthenocarpic) fruit. In Japan, these flowers are sometimes hand-pollinated with pollen from varieties that bear male flowers. Growers there believe that pollination helps to produce better fruit and that parthenocarpic fruit tends to drop prematurely. Hand-pollination is not practiced in Hawaii.

Location

Persimmon is grown commercially in Hawaii above elevations of 2000 ft (609 m). It is sometimes grown as a home garden fruit in cool locations at lower elevations. Most of the current production is in the Kula district of Maui, where persimmon flowers in March and April. Rainfall of at least 30 in. (762 mm) is required for good performance.

Wind damage seldom occurs in Kula, but in other areas, trees should be protected from strong winds. In the spring, the young foliage is easily damaged. In the fall, premature defoliation by wind affects fruit quality and the next year's production. Branches with heavy crop loads may be broken during windy weather. Shading by windbreak trees should be avoided. If persimmon does not receive full sun, weak growth and fruit drop may result.

Soils

Persimmon grows best on loamy soils, such as the Kula series. Light, sandy soils are not suitable, but it will grow on many other soil types and is tolerant of heavy clay soils if drainage is not severly impeded. Soil pH of 6.0 to 6.5 is preferred.

Harvest

Persimmons are harvested when mature but still firm, with color nearly fully developed. 'Maru' fruit is greenish yellow when ripe; 'Fuyu' and 'Hachiya' fruits are orange. The fruit is removed from the tree by clipping or breaking the stems, leaving the calyx lobes attached to the fruit (Figures 2, 4, 6). Persimmons must be handled carefully to avoid damage. Rough handling causes bruising and skin discoloration.

Harvest season varies with elevation, being later at higher elevations. The usual harvest season for 'Maru' in Kula is October to November; for 'Fuyu', October to December; and for 'Hachiya', November to December.

Postharvest

Both 'Fuyu' and 'Maru' fruits are firm when ripe. 'Maru' fruit needs to be cured after maturity to remove astringency caused by tannins. The nonastringent 'Fuyu' fruit is ripened on the tree and is ready to eat when harvested. 'Hachiya' fruit can be picked when firm and ripened at room temperature until soft. Its astringency is eliminated during the ripening process. Its color should be well developed before picking, or it may soften unevenly and remain astringent.

Astringency is removed from 'Maru' persimmons by a number of curing methods. Pollination may cause the fruit to cure on the tree. Pollination is indicated by the presence of seeds in the fruit, and the tree-cured fruit is known as "chocolate" 'Maru'. Two common postharvest curing treatments involve enclosing fruit in an airtight container and exposing it to the vapors of ethyl alcohol (35 to 40 percent alcohol) or dry ice (frozen carbon dioxide). In one example of an alcohol method, about 30 lb (13.6 kg) of fruit is treated with

5 oz to 7 oz (148–207 ml) of ethyl alcohol, sealed for three days, then removed and held at room temperature for several days until edible (Kitagawa and Glucina 1984). The liquid alcohol need not contact the fruit. With the carbon dioxide method, about 60 lb (27.2 kg) of fruit is enclosed with a 1.25-lb (0.6-kg) block of dry ice and kept sealed for two to three days. The dry ice should not contact the fruit. After curing, the flesh of 'Maru' fruits may contain brown spotting, which is a normal result of tannin breakdown (Figure 3).

Refrigeration after softening prolongs the storage life of 'Hachiya' fruit. For longer storage, persimmons may be peeled, pureed, and frozen or frozen whole in plastic bags. 'Maru' and 'Hachiya' fruits may be peeled when firm and dried; drying removes astringency.

Propagation

Diospyros kaki seedlings are the preferred rootstocks for persimmon cultivars. They develop long taproots with few fibrous laterals, and rootstock cultivars have been selected that produce vigorous, uniform seedlings. Rootstocks of *D. virginiana* (American persimmon) and *D. lotus* (date plum) are known to be better for wet soils, but the former produces variable trees and excessive suckering. *D. lotus* is susceptible to crown gall and is incompatible with 'Fuyu'.

Seeds are sown in 3-in.-deep (7.6-cm) containers. When seedlings are 3 in. (7.6 cm) high, they are transplanted to deep plastic planting bags—6 × 18 in. (15.2 × 45.7 cm)—or to nursery beds. At that time, the bottom one-fourth of the taproot is pruned to encourage lateral rooting. Grafting is done during the dormant season on rootstock stems that are at least 3/8 in. (9 mm) in diameter. Whip-grafting low on the rootstock is preferred, but chip-budding is also done. Scions with two to four buds from the previous season's growth are used. After grafting, the scion should be enclosed in a plastic bag to maintain high humidity. Large plants may be bark-grafted or cleft-grafted. In Hawaii, the three cultivars commonly grown develop very few seeds, and seed for rootstocks is usually obtained from California.

Cultural Practices

Tree spacing averages 15 ft to 20 ft (4.6–6.1 m) apart but varies with cultivar and soil fertility. Generally, wider spacing is used on deeper, more fertile soils. In Japan, trees are sometimes planted at close spacing and thinned after five to 10 years. Care is necessary when transplanting to the field, because persimmon roots are fragile and easily damaged by drying or rough handling. Young plants are trained to a modified central-leader structure by pruning shoots during the first few seasons, forcing growth into framework branches. The aim is to develop a pyramidal shape with from three to five main limbs at about 1-ft (30-cm) intervals on the trunk, beginning at about 3 ft (91 cm) above ground level. Staking with 5-ft (1.5-m) stakes may aid in training young trees. Pruning mature plants is done during the dormant winter months (Figure 7) to remove crossover, diseased, or broken branches. Pruning is also done to remove weak, shaded branches, open the canopy to prevent self-shading, reduce excessively vigorous shoot growth, and regulate crop load.

Persimmon fruit is borne on the current season's branch growth. After three to five years, bracing may be needed to prevent the weight of the fruit from breaking branches (Figure 8). Pruning secondary branches so that bearing shoots are kept close to the main branches may help to avoid a drooping habit and reduce the need for bracing. 'Fuyu' fruit clusters are usually thinned to increase fruit size.

Irrigation to supplement rainfall is desirable at times such as after transplanting, particularly when bare-rooted stock is used; during the spring growth flush; and during summer, if weather is dry or soils are shallow.

Commercial growers in Hawaii use either 16-16-16 or 10-20-20 N-P-K fertilizer, applied in February or March when new shoots emerge. Excessive nitrogen fertilization will force vegetative growth, so moderate fertilizer applications are desirable.

Diseases of Persimmon

Crown gall (*Agrobacterium tumefaciens*)
Anthracnose (*Colletotrichum* sp.)
Fruit drop (physiological causes, including excessive shoot growth, insufficient sunlight, and lack of pollination)

Insect Pests of Persimmon

Mealybugs
Ants (associated with mealybugs)
Thrips
Mites
Fruit flies

Selected References

K. W. Opitz and J. H. LaRue. 1975. Growing persimmons. Division of Agricultural Sciences, University of California, Berkeley. Leaflet No. 2457. 8 pp.

H. Kitagawa and P. G. Glucina. 1984. Persimmon culture in New Zealand. New Zealand Department of Science and Industrial Research, Science Information Publishing Centre, Wellington. Information Series No. 159. 74 pp.

Figure 5. 'Hachiya' persimmon.

Figure 6. 'Hachiya' fruit cluster.

Figure 7. Section of a persimmon orchard during the dormant period.

Figure 8. Fruiting persimmon tree with branches braced.

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