

Persimmon Cultivation in India

Sonal D. Jadhav¹, P.P.Bhosale², D.D.Nangare³, Vijaysinha Kakade⁴,
Sangram Chavan⁵

¹Young professional, ICAR- National Institute of Abiotic Stress Management, Pune

²Young professional, ICAR- National Institute of Abiotic Stress Management, Pune

³Scientist, ICAR-National Institute of Abiotic Stress Management, Pune,
Maharashtra, India

⁴Scientist, ICAR-National Institute of Abiotic Stress Management, Pune,
Maharashtra, India

⁵Scientist, ICAR-National Institute of Abiotic Stress Management, Pune,
Maharashtra, India

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Introduction

Persimmon (*Diospyros kaki* L.) belongs to the Ebenaceae family, and is widely consumed in Asia but it was only some years ago when it was introduced to the occident. Persimmons are sub-tropical, climacteric fruit, externally attractive with very little acidity and primarily sweet flavour. It belongs to the order Ebenales, and genus *Diospyros*. The family Ebenaceae includes 6 genera and 400 species and the genus *Diospyros* includes 200 species of which only four species are cultivated. Cultivation of persimmon under tropical conditions is limited and opinions differ on the suitability of this crop in the tropics. Successful adaptation of this crop to tropical conditions is dependent on an understanding of its eco-physiology. It has a relatively low winter chilling requirement in comparison with other deciduous fruit crops. The tree tends to have a higher tolerance to heat, water stress and water logging than other deciduous fruit crops. However, productivity and fruit quality are particularly sensitive to environmental stress. Productivity is limited by a low carbohydrate status over critical phenological stages. Persimmon has also showed in clinical trials potential benefits in important diseases such as obesity, diabetes, cardiovascular diseases, and cancer.





Persimmon benefits are related to its high levels of bioactive compounds like polyphenols, carotenoids, etc. However, there are numerous different genotypes with some differences among them. Overall, we can distinguish between astringent and non-astringent genotypes.

Distribution

Major Persimmon producing countries are China, Korea, Japan, Brazil, Italy, Israel, Australia and India. In India Persimmon grown in HP, J and K, TN, Uttarakhand etc.

Tree description

It is a monoecious tree grows up to a height of about 5-15 m. The trees are deciduous and complete their dormancy in the middle of February. The dormant trees, can tolerate fairly low temperature as low as -15°C . Non-astringent cultivars require warmer conditions for fruit maturation than the astringent types. Leaves are large, dark green, ovate and flowers light creamy. Elemental micronutrients present in persimmon fruit include potassium, sodium, iron, calcium and many others. Not just the fruit, the leaves, calyx and other parts have importance in health. (Butt et al., 2015)

Flowers

Persimmon is a dioecious plant however some plant may have hermaphrodite flower. So, plant may be monoecious, dioecious and polygamous-dioecious. Flowers are produced laterally on current season growth. Generally, the cultivar of commercial value only has female flowers, which produces seedless fruits. It bears yellowish white flower. Female flowers are large and cream colored with dark green four lobed calyx. Male flowers are small and occurred in 2-3 flowered cluster. Flowering starts in mid of March and continues up to second fortnight of April. The staminate (Male) flowers have 16 to 24 stamens while pistillate flowers have eight staminodes (Sterile stamen that does not bear pollen).





Flowers of Persimmon

Health Benefits

- Persimmons are delicious and exotic fruits that do more than serving as a sweet and tasty treat; they have a wealth of health benefits packed inside them
- Ability to improve eye health, reduce signs of aging
- prevent various types of cancer
- Improve digestion, boost immune system
- Lower cholesterol, increases metabolism strengthens bones, boost cognitive function, lower blood pressure, and skincare.
- Furthermore, they help the body to heal faster, aid in weight loss, reduce inflammation, and increase blood circulation throughout the body.

(Arsalan Seher and Bayrakei, 2016) (Muhammad *et al.*, 2017)

Table 1. Nutritional value of Persimmon

Nutrient	Amount (per 100 g)
Water	78.6
Protein	0.7 g
Fat	0.4 g
Carbohydrates	19.6 g
Fiber	3 g
Vitamin B1 (Thiamine)	0.03 mg

Vitamin B2 (Riboflavin)	0.02 mg
Vitamin B3 (Niacin)	0.1 mg
Vitamin C (Ascorbic Acid)	11 mg
Calcium (Ca)	6 mg
Iron (Fe)	0.3 mg
Phosphorus (P)	26 mg
Calories	77

Soil

Persimmon grow best on loamy soils. Light, Sandy soil are not suitable for Persimmon cultivation. This fruit cultivation can also be done in heavy clay soil if good drainage facility is available. A pH range of 5.5 to 6.5 is preferred for cultivation of this fruit.

Climate

Persimmon can be cultivated in warm temperate and sub-tropical region. The mid hill region of Nepal at an elevation of 1000 m to 1800 m is found suitable for Persimmon cultivation. This fruit can be grown in east-west range of mid hills area of Nepal. The agro-climatic condition of surrounding area of Kathmandu valley is suitable for Persimmon cultivation. The fruit has been successfully grown at an altitude of 1,830-2,500 m in China and above 1000 m in Indonesia. Suitable range of temperature is 14-22°C. The annual temperature for perfect sweet persimmon ranges from 14.6-15.7° C. Perfect sweet persimmon need warmer temperature than astringent type to remove astringency. Perfect sweet persimmon is weak winter hardiness and it suffers from winter chilling injury when exposed to temperature below -15°C while the astringent type persimmon fruit can tolerate temperature below -25°C. 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. Temperature 8-11°C for 888 hrs is enough to complete dormancy of persimmon.

Propagation

Persimmon can be cultivated or propagated by both sexual and asexual methods:-

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1. Sexual propagation

Mature seeds are used to propagate rootstocks. The fresh seeds of Persimmons can be used to grow seedlings. For better germination, seeds should be stratified approximately at 45° C for 60-90 days. Now, these seeds can be grown in boxes at 70 F. Seedlings are lined out in the spring when the soil temperatures are 55°F or higher. For better lateral root development, Seedlings should be transplanted when they become 6 to 8 inches tall. Seedlings can be grafted at the end of one season's growth, when the rootstock and scion are dormant. Germinates best at 28°C.

2. Asexual propagation

✓Grafting

Grafting is the process of unification of stock and scion of two different plants of same species. For this fruit, Dormant period is the best period for grafting when the rootstocks become $\frac{1}{3}$ inch in diameter. The diameter of scion should be $\frac{1}{4}$ to $\frac{1}{3}$ inch with height of about 3 to 5 inches and 2 to 4 buds. It is important to take scion from a healthy and well lignified parent plant during winter dormancy period.

Planting

This fruit is planted during July or early August. A pit of 1 m³ is dug. Spacing depends upon cultivar and soil type. For dwarf, semi-dwarf and vigorous cultivars spacing should be 5.0 × 2.5 m, 5.0 × 3.0 m and 6.0 × 4.5 m respectively.

Intercultural Operation

There are some activities to carried out after the plantation of tree and before its harvesting which are called Intercultural Operations. Some intercultural operations to be performed in period of this fruit cultivation are:-

Training and Pruning

Persimmon tree need to be trained to provide a structural strength, to make intercultural operation easier and for Better light penetration. Dwarf cultivar are suited to Centre leader

system of training whereas semi-dwarf cultivar are suited to palmette system. Pruning is also an important practice. The best time to prune Persimmon is in the winter while the tree is dormant. The diseased, dead and broken branches are completely removed while all other branches are trimmed to 1/3 to a bud. Summer pruning is also practiced. Summer pruning improves the fruit size and color. Heavy pruning should be avoided.

Irrigation

Adequate water is required for the establishment of newly planted trees. Frequent irrigation for 2 to 4 times per week is required after planting. The quantity of irrigation is determined by several factors including rainfall, soil type and evapo-transpiration. On maturity fruit become more drought tolerant. Water availability is essential during the main growth phase in first few month of season. However, water availability is important during flowering and fruit set. When natural precipitation is unable to fulfill the water requirement of plant, irrigation is applied in July and August.

Harvesting and Yield

Persimmons are harvested when mature but still firm, with color nearly fully developed. Flowering starts in the mid of March and continues up to second fortnight of April. Fruits are flat-globose, conical globose, with orange, reddish orange and orangish red colour, which mature in September- October. Flesh colour is orange with fibrous pulpy texture. The fruit is removed from the tree by clipping or breaking the stems, leaving the calyx lobes attached to the fruit. The weight of fruit ranges from 50 to 300 g. The full grown tree yield around 150-200 kg fruits annually. The matured fruits are yellow to orange in color and become visually attractive. (Singh *et al.*, 2011)



Fruits of Persimmon

Storage

The fruits are sweet in taste when fully ripened in case of astringent types Non-astringent types have longer shelf life of about 15-20 days than astringent types at ambient temperature. It can be stored at temperature of 0-2°C for 2-3 months.

Fruit Thinning

Fruit thinning is important to regulate the crop load and it also helps to overcome the alternate bearing tendency of crop. The crop regulation can be done through judicious pruning during the winter. Thing of fruit can be done either manually or by the application of chemicals. Hand thinning is done just after the first natural fruit drop or after 3 weeks of flowering. Fruit should be placed 6 inches apart in order to prevent rubbing damage to adjacent fruit.

Varieties

1. Fuyu

It is the most popular non-astringent variety. An average temperature of 15°C or higher is required for its cultivation. It has pale yellow flesh with sweet taste and consist of 2 to 4 seeds per fruit. It is harvested in November. The Fuyu persimmon is a non-astringent variety that benefits from a trifecta of qualities; it lacks a core, seeds, and tannins.

Fuyu persimmons have a squat and rounded shape and are capped with an indented leaf. Fuyu persimmons boast an orange pumpkin color on both its skin and flesh.



Fuyu

2. Jiro

This is second mostly cultivated variety and it is known for its excellent fruit quality and fine texture. Jiro persimmons are a medium to large varietal, averaging 10 to 12 centimeters in diameter, and have a round to oblate, and slightly flattened square shape with four shallow vertical creases. The fruit's skin is smooth, waxy, and taut, showcasing a faint sheen, and transitions into a dark red-orange hue when ripe. The average weight of a fruit is 250 to 260 g. The harvesting season is late October to early November.



Jiro

3. Gosho

This is an old variety and has beautiful appearance. It is known for its fine texture and sweet taste. Gosho persimmons are a medium to large varietal that bears a round to flattened shape with slightly square shoulders, lightly tapering to a narrower, curved base. Fruit drop during maturation is the major problem associated with this variety.

The average fruit weight is about 159 g.



Gosho

4. Suruga

This is a new and promising variety. This tree is vigorous and gives a good yield and have average fruit weight of 200 g. It has good storage ability. The Suruga Persimmon Tree has a non-astringent taste making it a sweet and savory snack. The color of the fruit is a warm, orange-red color that looks fantastic on top of the green foliage.



Suruga

Diseases and Pest

Diseases and pest can destroy our cultivation totally. Therefore, it is necessary to know all the diseases and pest for the successful cultivation of Persimmon.

1. Persimmon Anthracnose

It is the fungal disease caused by *Colletotrichum gloeosporioides*. It is the fungal disease thriving in wet condition and often appear in spring. Anthracnose symptoms first appear in spring on twigs, leaves and fruit as darkish oval or elliptic spots. Under favourable condition, these adjacent lesion may coalesce and form large sunken necrotic lesion. Anthracnose also causes the immature fruit drop in Persimmon. Selection of resistant variety and maintenance of proper drainage facility would be beneficial to overcome this problem.

2. Crown gall

It is caused by *Agrobacterium tumefaciens*. It causes tumours and cancer like growth in lower stems and roots. The bacteria may enter through wounds in plant surface. Mechanical injuries of roots and other plant parts by cultivation equipment, animals and insects are also the important point.

3. Root and crown rot

It is caused by *phytophthora* spp.

4. Gray mold

It is caused by *Botrytis cinerea*

Persimmon pest

1. Mealy bug

It feed the plant sap from leaf and stem. Honey dew and sooty mold further disfigure infected plant which may eventually be killed.

2. Scales

It leads to copius honey dew production and high probability that sooty mold fungus will disfigure host plant and foliage of adjacent plant species.

3. Fruit flies

In case of fruit flies adult are not so destructive. Larvae feeding in fruits are most damaging. It causes internal rotting of fruits associated with maggot infestation. Infected young fruits becomes distorted, callused and usually drop.

4. Twigs girdlers and borer



Major damage is caused by larva which creates galleries (mine) between bark and wood. A full grown larva may bore from 1 to 2 inches deep in the wood of bark.

Problems in Persimmon Cultivation

1. Biennial Bearing

Fruit trees show many irregularities in bearing habit. During one year the fruit tree bears heavily whereas little or no production in following year. The tendency of fruit tree to bear heavily on alternate year is called as biennial bearing. Persimmon fruit also exhibit such problem. Fruit thinning, deblossoming and light summer pruning can be adopted to overcome the alternate bearing problem.

Conclusion

Persimmon (*Diospyros kaki* L) is one of these nutritious fruits with strong antioxidant activity. It is a popular and widespread fruit that is enriched with many bioactive compounds, including polyphenols, terpenoids, steroids, flavonoids, carotenoids, minerals dietary fibre. It has ability to improve eye health and prevent various types of cancer. It has longer shelf life of about 15-20 days that's why it helps the farmer to avoid losses from spoilage of fruits.

References

- Arsalan Seher and Bayrakei, "Physicochemical, functional and sensory properties of yogurts containing persimmon"; Turkish Journal of Agriculture and Forestry, 40 (2016): 68-74
- Butt Massod Sadiq, Sultan M.Tauseef, Aziz Mahwish, Naz Ambreen, Ahmed Waqas, Kumar Naresh, Imran Muhammad, "Persimmon (*Diospyros kaki*) Fruit: Hidden Phytochemicals and Health Claims", EXCLI Journal, 14(2015): 542-561
- Kashif Muhammad, Akhtar Naveed, Mustafa Rehan, "An overview of dermatological and cosmeceutical benefits of *Diospyros kaki* and its phytonutrients: Review"; Brazilian Journal of Pharmacognosy, 27 (2017): 650-662



Singh Brajeshwar, Srivastava J.N, Verma V.S. and Razdan V.Z., “Cultivation of Persimmon in India”, Rashtriya Krishi, 6 (2), (2011): 1-2

