

## Week - 13: Persimmon cultivation

### Objective:

The aim of this lecture is to provide knowledge to students on persimmon cultivation with respect to area, production, varieties, rootstocks, propagation, planting density, training and pruning, Manuring and fertilization, after care, weed management, irrigation, harvesting and post harvest management.

## INTRODUCTION

### Taxonomical classification

Family	=	Ebenaceae
Genus	=	Diospyros
Species	=	Kaki
Basic chromosome	=	15
Somatic nos = 60, 90		

## INTRODUCTION

- Persimmon (*Diospyros Kaki* L.) is considered as the national fruit of Japan.
- The genus *Diospyros* contains approximately 400 species, most of which are native to tropical and sub-tropical regions.
- It is probably originated in China, where it has been cultivated for centuries. It was introduced from China into Japan in ancient times, where most of its improvement work has been done.
- In nineteenth century, it was introduced from China to many other countries namely USA, Brazil, Italy, New Zealand, Israel, Australia and South East Asia.
- In India, the European settlers introduced persimmon in hilly states namely Himachal Pradesh and Jammu and Kashmir somewhere in 1921.
- At present, it is grown on a limited scale in Jammu and Kashmir, Himachal Pradesh and Uttarakhand.
- No organized plantation of this fruit has get been done in India but with the diversification in fruit culture, it cultivation is gaining importance.
- Ripe fruit is delicious, flesh is sweet and jelly like. The entire fruit is edible except seed and calyx.

### Area and Production:

- China and Japan are the main countries where commercial cultivation of persimmon is done. These two countries contribute major share to the global market.
  - In recent years, its cultivation is also done in Brazil, Italy, New Zealand, Korea, USA and Australia.
  - In the world it occupies an area of 312974 ha with a production of 23335607 MT.
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## Climate and soil:

- Persimmon can be grown in a wide range of subtropical and warm temperate climate.
- The areas 1000 to 1500 m amsl that have moderate winter and relatively mild summer are ideal for its cultivation
- It is a deciduous tree and can tolerate low temperature of -15°C during dormancy, but its chilling requirement is less (less than 200 hrs), bud sprouting occurs early in the spring.
- These buds are damaged by the spring frost.
- During the maturation period, temperature is the most important factor for obtaining quality fruits. Non astringent cultivars require warmer condition for fruit maturation than the astringent type.
- Although persimmon can grow on a wide range of soil types yet it thrive best on deep, well drained loamy soil.
- A pH range of 6.5 to 7.5 is ideal for its growing.

## Varieties:

The fruit of Japanese persimmon shows wide variations in size, shape, and colour, and are broadly classified into two major groups.

- (1) Non astringent
- (2) Astringent group

## Varieties are also divided on their response to pollination.

- (i) Non-astringent and constant pollination (PCMA)
- (ii) Non-astringent and variant pollination (PVHA)
- (iii) Astringent and constant pollination
- (iv) Astringent and pollination variant

**Astringent cultivars:** - Eureka, Hachiya, Honan Red, Triumph, Saijo

**Non-astringent cultivars:** - Fuyu, Jiro, Hana Fuyu, Suruga, Gosho

**Pollination variant cultivars:** Chocolate, Gailey, Hayakume, Maru.

## ROOTSTOCKS AND PROPAGATION

### Rootstock

- D. kaki, D. lotus and D. virginiana are used as a rootstocks for persimmon
  - In India, Diospyros lotus is used as the rootstock.
  - The D. virginiana is used as rootstock for Japanese persimmon in Israel and USA.
  - The seeds are extracted from fully ripened fruits during late-October.
  - The stratification of seeds for 60-90 days improved seed germination.
  - The stratified seeds are sown in the nursery beds.
  - The best seed germination is obtained at 28°C. The seeds at this temperature take about 2-3 weeks to germinate.
  - Young seedlings usually take a year to be of suitable size for grafting.
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## Propagation

- Propagation is done by grafting the scion on seedling rootstocks, using the tongue graft for smaller diameter stocks and the cleft and veneer grafting on the larger stock.
- Veneer grafting is generally more successful than budding and should be carried out in September with the start of sap movement.
- Tongue grafting is also done with a success rate of 60-65%.

## Planting and planting density:

- In India, winter planting during January-February is recommended when trees are dormant. Planting after bud sprout generally results in poor survival.
- The trees are planted at a distance 5.5-6.0m.
- The pits of 1m x 1 x 1m are dug. Well rotten farmyard manure is mixed while filling the pits in the same manner used for other deciduous trees.
- At the time of planting the bud union should be kept 75 mm above the ground level.
- The planting density for persimmon depends on cultivar, rootstock and soil type. Dwarfing cultivars ( Jiro) can be closely planted at 5m x 2.5m (800 trees/ha), semi-dwarf cultivars Fuyu at 5m x 3m (660 trees/ha) and vigorous cultivars at 6mx 4.5m (370 trees/ha).

## CULTURAL PRACTICES

### Training and pruning:

- The trees should be trained to form a low head. To achieve this, the plants are headed back at 60 cm from the ground at the time of planting to develop a frame work of strong branches.
- The dwarf and semi-dwarf cultivars are best trained to a modified central leader system. The more vigorous, upright, narrow crotch angle types should be trained to a vase or palmate system.
- The pruning is done during winter when the trees are dormant in January. Since flowers of D. kaki are borne on current season's wood, heavy pruning reduces crop setting by forcing excessive vegetative growth.
- Summer pruning of mature trees may thicken laterals and increase fruit size and colour. With more vigorous and less precocious cultivars, techniques such as cincturing and limb spreading may be beneficial to achieve higher and earlier fruit production.
- In case of grown up trees, practically no pruning is done except for removing weak, interfering, discarded or insect damaged shoots and branches.

### Manuring and fertilization:

- Persimmon does not require high fertilizer doses.
  - An application of balance fertilizer (10:10:10) at a rate of one pound per inch of trunk diameter at ground level is recommended before bud-break.
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## **Aftercare:**

- After planting, young plants need a continuous care for their survival.
- The plants need staking to keep them in a straight position which helps in selecting the well spaced laterals in the coming growing season.
- Watering at 7-10 days interval is essential.
- The plant basins are kept free of weeds.
- During hot summers, when the evapo-transpiration rate is high, the plants require mulching with dry grass/dry leaves. Mulching needs to be done in the first week of March.

## **Irrigation:**

- Irrigation is considered essential for the successful production of persimmon.
- Dry periods during fruit growth reduce the size, quality and number of fruits carried to maturity.
- Moisture deficiency during early summer may increase fruit drop.
- The peak water requirement periods are in mid summer. Due to high evaporation during summer months the irrigation is very essential to maintain uniform soil moisture.
- The young and bearing trees are irrigated at 6-7 days intervals during summer months.

## **Maturity indices, Harvesting and Post harvest Management**

- Persimmon fruits are harvested when they have attained yellow to reddish colour but are still firm.
  - The fruits are clipped from the trees with shears leaving the calyx attached to the fruit together with a short stem.
  - More care is needed to avoid bruising.
  - Persimmon fruits mature in mid September, although the period of maturity varies among the different varieties.
  - If fruits are harvested too early, they develop poor colour, sweetness and flavor.
  - Fruits after harvesting should be wrapped individually in paper and packed in a single layer crate.
  - Persimmons soften at room temperature.
  - Ripe persimmons are delicious. Flesh is sweet and jelly like.
  - Brix level at maturity in different varieties varies between 14- 170C.
  - The persimmon trees start bearing 4-5 years after planting. However, dwarf and semi-dwarf cultivars start bearing 2-3 years after planting.
  - Mature trees of Fuyu are capable of producing 50 kg fruit/plant.
  - Jiro cultivar has recorded over 80 kg/plant, whereas in the Hachiya, the yield is over 100 kg/plant.
  - The decrease in astringency during growth and maturation of astringent cultivars and disappearance of astringency from non-astringent varieties are most striking.
  - Various methods have been suggested to remove the astringency from the astringent cultivars, however, most of these result in partial softening of fruits. Treatment of the fruit with carbon dioxide has been the most successfully developed technique till date.
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Dipping of fruits in 500 ppm Ethephon solution for 2 minutes helps in removing the astringency in cultivar Hachiya and the fruits are ready for consumption with 2-3 days of storage.

- The persimmons are also allowed to sweeten naturally after harvesting from the plants at room temperature, although they can be held in form conditions for 2-3 months at 30-32°C and 85-90% relative humidity. Average freezing point of flesh is 28.20°C.
- Persimmon is graded by size and quality. During grading and packing, handling should be kept minimum to avoid bruising. The most popular packages for persimmons are single layer trays commonly used for stone fruits.