

Week - 15: Pecan nut cultivation

Objective:

In this lecture the students will be acquainted with area and production, climatic and soil requirements, varieties, rootstocks and propagation, training and pruning, manure and fertilizers application, after care, irrigation, fruit thinning, harvesting and post-harvest management of pecan nut.

INTRODUCTION

Taxonomical classification

Order	=	Fagales
Family	=	Juglandaceae
Genus	=	Carya
Species	=	illinoensis
Basic chromosome	=	16

Introduction:-

- Pecan is a valuable horticultural gift of North America to the world.
- In USA, it is considered as “Queen of nuts” because of its value both as a wild and as a cultivated nut.
- As compared to other nut fruits, which have been grown since time immemorial, pecan has been under cultivation only for about one hundred years but has gained enormous popularity.
- Pecan occupying fifth rank among leading tree nuts because of its excellent nutty flavor.
- Pecan nut is a rich source of fat (72 g) protein (9 g), carbohydrates (15 g) and minerals.
- Pecan is usually taken roasted or salted to supplement normal diet.
- Almost 90% of the nuts are sold shelled and rest in shell.
- The nuts are commonly used to add aroma, flavor and crispness, a rich colour or to garnish a large number of dishes.
- However, most commonly it is used in baking dishes and in ice creams.
- Pecan shell, a by product is also used to manufacture tannin, charcoal and abrasives in hand soap.
- The pecan tree has a value as a timber too, due to its strength and hardness. There is a great demand for its veneer and lumber in decorative paneling, fine furniture, and flooring and in pallet manufacturing.

Origin and Distribution:

- Pecan is said to be native of North America but it was also opined that it originated during Cretaceous period in Canada and moved south in recent geological times.
 - Spanish explorers found pecan growing along the Mississippi river and its tributaries.
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- The native habitat of pecan ranging from Texas in the southwest to Alabama in southeast extending up to Southern Illinois.
- Besides USA, the world wide distribution of pecan confined to Australia, Canada, Egypt, India, Israel, Mexico, Peru, Turkey and South Africa.
- In India it is grown in Himachal Pradesh, Jammu and Kashmir, Uttarakhand and in the Nillgri hills where it was introduced in mid-thirties.
- In Himachal Pradesh, its plantation remained confined to the areas of Kangra, Mandi, Solan and Kullu districts, which constitutes approximately 700 ha area.

Soil and climate:-

Soil:

- Pecan tree can be grown on varied soil conditions ranging from the sandy loam to clay loam and alluvial soil of river and small streams but they all have certain common characteristics.
- The soil should be deep, loose, well drained and well aerated to a great depth.
- Soil that is deficient in any of these requisites may support young trees but fail when the trees attain greater age and size with corresponding greater requirements..
- Pecan can be grown satisfactory where pH ranges from 5 to 8.

Climate:-

- The climate is probably the main constraint in the expansion of pecan cultivation.
 - It needs warm temperate climate meaning thereby that the extreme of both temperate and sub-tropical climates are undesirable.
 - The pecan requires a long frost-free period from the time when growth starts in the spring until the nut matures in the fall.
 - It is influenced by minimum temperature and number of chilling hours during winter.
 - An ideal climatic environment for pecan cultivation consists of growing season of 240-280 days, mean temperature above 26.70C, heat unit accumulation (base 100C) of 5000 degree days for 7 months, nut growing period, mean temperature for three coldest month between 7.20C and 12.80C with at least 400 h of chilling.
 - High humidity affects adversely the growth, fruiting and regularity of bearing in plant by preventing pollination, increasing the incidence of diseases on leaves and nuts.
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- Hailstorms and winds of high velocity are harmful to the trees.

Varieties:

- In pecan nut size, shell thickness and cracking attributes are desirable for selecting a variety.
- Some important pecan varieties grown in country and other parts of the world are Mahan, Nellis, Stuart, Western Schley, Mohawk, Cheyenne, Chicksaw, Desirable



PROPAGATION AND CANOPY MANAGEMENT

Rootstocks and Propagation

- Seedlings of various cultivars like Burkett, Nellis and western Schley are generally used as rootstock for pecan nut as there is no clonal rootstock.
- The bitter pecan (*C. aquatica*) is adapted to poor drainage, flooding condition and low pH but gives low yield.
- For raising the seedlings rootstocks, the seeds are stratified at 4°C for 70-90 days.
- Cold stratification of the nuts for 70 days followed by soaking in GA3 (500 ppm) for 48 hrs gives good germination and subsequent seedling growth.
- After stratification, the nuts are sown in well prepared nursery beds at a spacing of 15 cm from seed to seed and 20 cm apart in rows.

- After sowing of seeds, the nursery beds are mulched with 10 cm dry grass and light irrigation is given.
- As the seeds start germinating, mulch is removed and proper weeding, irrigation and hoeing is done at regular intervals so that seedlings attain graftable and buddable size in a year.
- Pecan is commercially propagated by budding and grafting onto seedling rootstocks
- The seedling rootstocks are budded with patch and annular method in July and tongue grafted in Feb- March.

Planting:

- The best time of planting for pecan is dormant season, late winter or early spring just before bud swelling..
- In flat land, the pecan nut is planted in square system at 10-12 m spacing.
- In sloppy lands contour and terrace layout of planting system are adopted.
- The plant spacing depends on the cultivar and fertility of the soil.
- The distance can be reduced to 8-10 m on soil with low fertility.

Training and Pruning:

- The training in pecan begins with the planting when 1/3 of the top is removed and branches are allowed to emerge as high as 1-1.5 m from the ground level.
- The pecan trees are trained in central leader system and from the second year onwards the subsequent branches should be spaced spirally at 30-35 cm from one above the other.
- As the pecan trees advance in age, they become larger and get crowded making pruning, spraying and harvesting operations difficult.
- Pruning of pecan nut trees is, therefore, desirable but is often neglected.. Once the framework is established very little pruning is done mature trees . Dried and broken and over crowding branches are removed.

CULTURAL PRACTICES

Aftercare:

- Pecan has very long growing season and requires proper management throughout to ensure good plant growth and productivity.
 - Mulching the basins with dry grass helps in conserving the soil moisture, control of weeds and adds organic matter on decomposition.
 - Rats poses big problems to pecan plantations and require protection by baiting against rats and keeping basins free from weeds and cultivation regularly.
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- Pre emergence and contact herbicides are generally used to control the weeds. Diuron and simazine (2.5 kg/ha) are widely used herbicides besides, paraquat @ 1 kg/ha can also be used as contact herbicide.
- Cover crops can also be grown during summer and winter especially on hilly slopes to check soil erosion and leaching of nutrients. Crops like soyabean, beans, cowpea and clover can also be grown in summer in young orchard before they come into bearing.
- Since pecan is planted at greater spacing and come into bearing late, it is advisable to grow intercrops till it starts bearing. Besides the seasonal crops filler trees such as peach can also be grown as an intercrop in the orchard.

Pollination:

- Pecan is a monoecious tree. The staminate and distillate flowers are borne separately on the same tree and organized into catkin and spikes respectively.
- The pecan has compound buds enclosing floral and mixed buds in separate bud scale but with a common outer scale. The floral bud develop to produce catkin but mixed bud grow either into a vegetative shoot or in a single pistillate inflorescence.
- There is complete or less complete dichogamy in pecan which often poses main difficulty in pollination especially in isolated plantings.
- The most pecan cultivars requires cross pollination for good fruit set.
- Wind is pollinating agent which carry pollens for about 900 meters.
- For good fruit set in pecan, planting should have 3-4 cultivars well dispersed in the orchard or at least 10 per cent pollinizer cultivar should be planted in the orchard.

Manures and Fertilizers:

- Pecan responds to fertilizer applications very slowly and effects on growth and yield are observed after two to three years. Thus the leaf analysis may not hold good in determining the nutritional status of the plant.
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- Pecan tree should be manured with 100 kg of farmyard every year in the month of December. In addition, apply 500 g N:P:K mixture (15:15:15) per year age of the tree up to 16 years.
- The full bearing trees of 16 years and above should be given 8 kg of NPK fertilizer mixture every year.
- Pecan trees are prone to zinc deficiency which can be corrected with foliar application of zinc sulphate @ 0.5 per cent.

Irrigation:

- Adequate moisture is required to improve growth and productivity of pecan.
- Irrigation improves kernel yield, nut weight and diameter, appearance and oil content.
- Pecan needs proper soil moisture all the year and requires irrigation even before shuck opening and it reduces the stick tight and viviparous nuts.
- The pecan trees are commonly irrigated through flood, basin, and drip irrigation methods at 6-7 days intervals during critical periods i.e flowering, fruit set, fruit and nut growth of water requirements.

Maturity and Harvesting

- The nuts are harvested when the husk or hull covering the shell becomes fairly loose.
 - A single shaking will bring down the bulk of the matured nuts which can be collected on a plastic sheet.

 - To enhance splitting, the hulled nuts may be dipped in water to moisten the shell and spread out in the sun to dry.
 - One method of salting the split nuts is to boil them in salt solution for few minutes, then re dry and store them.
 - If stored in plastic bags, nuts will last for at least 4 to 6 weeks in the refrigerator.
 - Frozen nuts will last for several months.
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