



PECANUT: CULTIVATION PRACTICES

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Introduction

One of the biggest gifts from North America to the world of horticulture is the pecan. In the USA, it is referred to as the "Queen of nuts" due to its importance as both a cultivated and wild nut. Compared to other nut fruits that have been farmed since the dawn of time, pecans have grown to be extremely popular in the relatively short time that they have been cultivated roughly a century. Owing to their exceptional nutty flavour, pecans are the sixth most popular tree nut. Minerals, protein (9 g), fat (72 g), and carbohydrates (15 g) are all abundant in pecan nuts. Typically, pecans are eaten as a dietary supplement, salted or roasted. The nuts are sold with their shells on for around 90% of the total, and without. Nuts are often utilised to improve a wide range of meals' flavour, crispness, rich colour, and smell. However, it's most commonly used in ice cream and baking dishes. Hand soap also contains abrasives, charcoal, and tannin derived from pecan shell, a byproduct of bay. Pecan trees are highly valued as timber due to their strength and tenacity. Its lumber and veneer are highly sought after for use in flooring, ornate panelling, fine furniture and pallet manufacturing.

Area and Production

Pecans, native to North America, likely originated in Canada during the Cretaceous period and later moved southward. Spanish explorers noted pecans along the Mississippi River, with their natural range spanning Texas to southern Illinois and Alabama. Today, pecans are cultivated in the U.S., Australia, Canada, Egypt, India, Israel, Mexico, Peru, Turkey, and South Africa. Introduced to India in the mid-1930s, pecans are primarily grown in Himachal Pradesh,

Jammu & Kashmir, Uttarakhand, and the Nilgiri Hills, with around 700 acres planted in Himachal's Kullu, Mandi, Solan, and Kangra districts.

Botanical Description

The pecan tree, *Carya illinoensis*, is a monoecious species with both male and female flowers on the same tree. However, its flowering follows a complex pattern known as heterodichogamy, where both protogynous (female-first) and protandrous (male-first) blooms are present. Dichogamy in pecans is controlled by a single gene, with protogyny being dominant. The tree exhibits an alternate bearing habit, with pistillate (female) flowers borne terminally on current season shoots and staminate (male) flowers in catkins that develop laterally on the previous season's growth. Pollination is mainly by wind, and cross-pollination is generally necessary for optimal fruit set; a 10% pollinizer variety alongside the main cultivar is often recommended. The fruit is globular to rectangular with a thin, winged husk that splits to reveal oblong, smooth-shelled nuts rich in oil and flavor. Pecan trees produce staminate catkins that emerge from mixed buds, which contain both floral and vegetative parts, and pistillate flowers in clusters that grow on current-season growth. Wind can disperse pecan pollen up to 900 meters, but due to the partial dichogamy, isolated plantings may face pollination challenges, making cross-pollination beneficial for yield.

Soil and climate

Pecan trees can thrive in various soil types clay, sandy, and alluvial as long as the soil is deep, loose, well-drained, and well-aerated. Ideal soil pH ranges from 5 to 8. Climate is a key factor, as pecans require warm, temperate

conditions, a long frost-free season (240–280 days), average temperatures above 26.7°C, heat accumulation of 5000-degree days over seven months, and at least 400 chilling hours in winter. High humidity disrupts pollination, heightens disease risk, and extreme weather like hail or strong winds can damage the trees.

Planting

Planting pecan trees is best done in late winter or early spring, when the buds are just beginning to swell. Plant pecan nuts in a square arrangement, 10 to 12 meters apart, on flat ground. In messy lands, planting techniques that make use of contour and terrace patterns are employed. Cultivar and soil fertility both affect plant spacing. The distance could be as small as 8–10 meters if the terrain is not fruitful.

Propagation and Rootstock

Pecan seedlings from cultivars like Burkett, Nellis, and Western Schley are commonly used as rootstock due to the lack of clonal options. Bitter pecan (*C. aquatica*), though low-yielding, tolerates flooding, poor drainage, and low pH. Rootstock seeds undergo 70–90 days of cold stratification at 4°C, followed by immersion in GA3 (500 ppm) for 48 hours to boost germination. Seeds are then sown in nursery beds, spaced 20 cm between rows and 15 cm between seeds, covered with mulch, and lightly irrigated. Mulch is removed at germination, and regular maintenance ensures growth. Seedlings are grafted via tongue grafting in February–March and budded with patch or annulus techniques in July for commercial production.

Rootstock Description:

Burkett: Nuts more or less round, 230 to 235 nuts/kg base flat to slightly pointed, kernel 62% of nut bearing regular, mature in second week of October.

Nellis: Nuts oblong, cylindrical tapering towards ends, 260 to 265 nuts/kg, kernel 55%, moderately

filled, bearing regular, mature in second to third week of October.

Western Schley: Nuts oblong, cylindrical shoulders even, kernel 57% it is recommended for high density planting. Bearing normal, mature in third week of October

Pecanut Varieties

The pecanut is largely self-fertile but dichogamous and some varieties there is no overlap of pollen shedding and stigma receptivity. Most varieties require at least 180 days and upto perhaps 220 days, for nuts to mature

Variety	Perc ent kern al	No. of nut s/kg	Polle n shed ding	Stigm a recep tivity	Matu rity
Desirabl e	56	110	Early	Late	Medi um
Elliot	43	172	Late	Early	Medi um
Ideal	56	143	Late	Early	Medi um
San Saba	60	-	Early	Late	Early
Success	52	110	Early	Late	Medi um
Stuart	49	116	Early	Late	Medi um
Monarch	27	143	-	-	-

Training and pruning

When pecans are planted, a third of their top is cut off, allowing branches to sprout up to 1-1.5 meters above the ground. This is the start of the training process. The pecan trees are taught using the central leader system, and starting in the second year, the branches should be spaced 30-35 cm apart in a spiral pattern. The pecan trees grow larger and more congested as they get older, which makes harvesting, spraying, and pruning challenging. For this reason, it is beneficial yet frequently overlooked to prune pecan nut trees. Mature trees rarely undergo

pruning once the structure is in place. Broken, dried, and crowded branches are cut off.

Nutrients & Fertilizer management

Pecans respond slowly to fertilizers, with growth and yield effects noticeable only after 2–3 years, making leaf analysis less reliable for immediate nutritional assessment. Each December, trees should receive 100 kg of farmyard manure. Trees up to 16 years old require 500 g of N:P:K (15:15:15) annually, while mature trees (16+ years) need 8 kg of the NPK mix yearly. Zinc deficiency can be corrected by foliar application of 0.5% zinc sulphate..

Irrigation

Consistent soil moisture is essential for optimal pecan growth and yield, enhancing nut size, appearance, oil content, weight, and kernel yield. Trees need irrigation year-round, especially before shuck opening, to reduce stick-tight and viviparous nuts. During key phases like flowering, fruit set, and nut growth, pecans are irrigated every 6–7 days using flood, basin, or drip methods.

Growth & Development

Phase I (Growth in Nut Size): The fruit grows slowly at first and more quickly over the course of ninety days after pollination to attain its maximum size. The fruit is fully mature by the end of August. During the first phase, which is also

known as the "water stage," the endosperm is entirely devoid of cells. Phase II (Nut Filling): This phase lasts until the husk splits, or until the water stops, or until the shell hardens. The kernel expands and thickens during this phase, which comes to a close when the hull separates along the sutures.

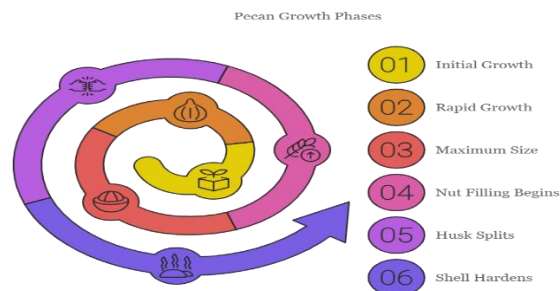


Fig. 1: Pecan growth and development

Harvesting and yield

The nuts are collected when the husk, sometimes called the hull, of the shell loosens slightly. After just one shaking, most of the mature nuts can be collected onto a plastic sheet. To facilitate splitting, the hulled nuts can be dried in the sun and then moistened with water by dipping them in it. After briefly boiling split nuts in a salt solution, they can be salted by re-drying and storing them. If kept in plastic bags, nuts will keep in the refrigerator for at least 4 to 6 weeks. Frozen nuts will remain fresh for several months.

Insect- Pest and their management

Pest/Disease	Symptoms/Signs	Control Measures	Application Timing
Pecan Weevil (Curculio caryae)	Round holes in nuts due to grub emergence.	Mustang Max (60-70 ml/acre), Sevin 80 S (0.6-0.7 kg/acre)	Start treatment around August 20th when nuts reach the dough stage. First treatment should follow a shower.
Black Pecan Aphid (Melanocallis caryaefoliae)	Necrotic and yellowed areas between leaflet veins, mainly affecting branches in the tree's center.	1.6 F (250-300 ml/acre), 2 F (300-500 ml/acre)	Begin treatment when an average of one aphid is found on each compound leaf. Sample 5-10 orchard trees.

Pecan Casebearer (Acrobasis nuxvorelle)	Larvae damage young fruit and flowering buds; newly hatched larvae feed on nuts and buds.	Imidan 70 W (0.5-0.9 kg/acre), Verify 2 F (400-200 ml/acre)	Start insecticide treatments when 1-3% of nut clusters show egg-laying signs.
Hickory Shuckworm (Cydia caryana)	Larvae burrow inside nuts before the shell hardens, occasionally leaving white stain markings at entry holes.	Lorsban 4 E (45-60 ml/acre)	Spray between August 10-15 during shell hardening. Two to three applications may be required, spaced 10-14 days apart.
Pecan Phylloxera (Phylloxera devastatrix)	Formation of hard galls on young leaflets or terminals; severe infestations can cause partial leaf drop.	Warrior (150-175 ml/acre)	Apply between bud opening and when the first ½ to ¾ inch of new growth emerges.
Leaf Blotch (Gnomonia arvae)	Blotting of leaves, circular dead spots on nuts, and cankerous spots on twigs.	Dodine (0.3%)	Apply in May to prevent the disease.
Brown Leaf Spot (Cercospora fusca)	Reddish-brown patches on leaves that develop a grey ring, causing defoliation in heavy rainfall areas or neglected orchards.	Bordeaux mixture (4:4:50 ratio)	Preventative application in June and July when symptoms appear.



Fig 2: Different parts of pecan plant

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