

# GROWING PECANS IN KANSAS

Nuts



By  
William Reid  
Extension &  
Research Horticulturist

Pecan is a large, beautiful tree that produces bountiful crops of delicious nuts. The largest member of the hickory family, pecan trees often grow to a height of over 70 feet and a spread greater than 80 feet. Pecans have large, pinnately compound leaves with each leaf bearing 7–13 leaflets. Nuts are borne on branch terminals in clusters of 2–5. A fleshy green husk surrounds the nut during the growing season but splits open in October to reveal the light brown nut that is streaked with black mottles. As husks dry and wither, nuts fall freely from the tree. Pecan nuts vary in size, shape, and shell thickness. Seedling pecan trees often produce small, thick-shelled nuts, while large, thin-shelled nuts are produced by trees grafted to improved cultivars.

Pecans truly are multipurpose trees. In the home landscape, these long-lived, sturdy trees provide ample shade and bright yellow fall color. Wildlife conservationists appreciate the food and cover pecan trees produce for squirrels, turkeys, and deer. In southeastern Kansas, wild pecan trees have been brought under cultivation to provide farmers with an additional source of income. Pecans are also one of Kansas' most reliable orchard trees.

A successful pecan planting requires good soils, adequate water, and prudent cultivar selection. Failure to provide the proper conditions for pecan tree growth often leads to poor growth and sparse nut production.

## Soil Requirements

Plant pecan trees in deep, well-drained soils. Native pecans grow primarily in the deep alluvial soils found along major rivers and streams. These soils are characterized by a clay loam to sandy loam texture, good internal drainage, and a static water table that ranges from 10-25 feet below the soil surface. Upland soils are suitable for pecan trees if they have at least 3 feet of friable topsoil and a sandy clay subsoil that allows free penetration of both water and air. In

good upland soils, pecan roots grow throughout both topsoil and subsoil. Pecan trees will not perform well if planted on upland soils having a subsoil impervious to root growth.

Pecan trees will grow and thrive in soils that range from slightly acid to slightly basic (pH 6.0–7.5). If trees are grown in sandy soils or soils with a basic pH (7.0 and above), zinc foliar sprays are often necessary to prevent zinc deficiency.

## Water Requirements

Pecan trees will grow without irrigation in areas of Kansas that receive an average of 30 inches of rain a year, but ample water throughout the growing season is necessary for good tree growth and regular nut production. Even mild drought conditions affect nut quality. A shortage of water early in the season causes nuts to be small, while a lack of water in August and September leads to poor kernel filling. Severe drought will cause nut abortion, premature defoliation, and a decrease in the subsequent year's nut crop. To ensure annual crops of high quality nuts, supplemental irrigation should be considered.

Pecan trees growing in the flood plains of eastern Kansas are frequently subjected to seasonal flooding. Although pecan is widely known as a flood tolerant species, trees cannot endure water saturated soils for an extended period of time. Leaves yellow and fall prematurely from flood-stressed trees.

## Cultivar Selection

Selecting the proper cultivars for your particular locality will help ensure that your pecan tree planting will be successful. When choosing pecan cultivars, several key characteristics should be considered. These include length of growing season, winter hardiness, productivity, flowering and pollination, and nut size and quality.

**Length of Growing Season.** Pecan trees use the entire growing season to develop their nut crop to maturity. To be successful in Kansas, a pecan cultivar must produce plump, well-filled nuts before the first fall freeze. Nut maturity in pecan is indicated by the splitting of the shuck and separation of nut from shuck. Freezing temperatures before shuck split cause the shuck to remain firmly attached to the nut, so that it never opens. The kernels inside these “sticktights” are usually shriveled and not fully formed.

Rate of kernel development in pecan is controlled genetically, but is also influenced by temperatures during the growing season. Summer heat, especially warm nighttime temperatures, is necessary for proper nut development. Unusually cool summers will result in a delay of nut maturity. Variation in weather patterns will cause a pecan cultivar to mature on slightly different dates from year to year. To avoid losing a crop to fall freeze damage, it is best to choose cultivars that mature at least a week before the average first fall freeze date.

**Winter Hardiness.** Pecan trees growing in Kansas are often exposed to severe winter temperatures. “Northern” pecan cultivars have proven cold hardiness and are best adapted for growth in our state. These cultivars are termed “northern” because they originated in the northernmost reaches of the pecan tree’s natural range. Only a few “southern” pecan cultivars are adapted for growth in extreme southeast and south central Kansas.

**Productivity.** The nut-producing capacity of a cultivar is important. A cultivar able to produce a nut crop every year is far more desirable than an alternate-bearing cultivar. In addition, a cultivar that produces a large crop of medium-sized nuts will yield more nut meat than a cultivar that produces only a few “jumbo” nuts.

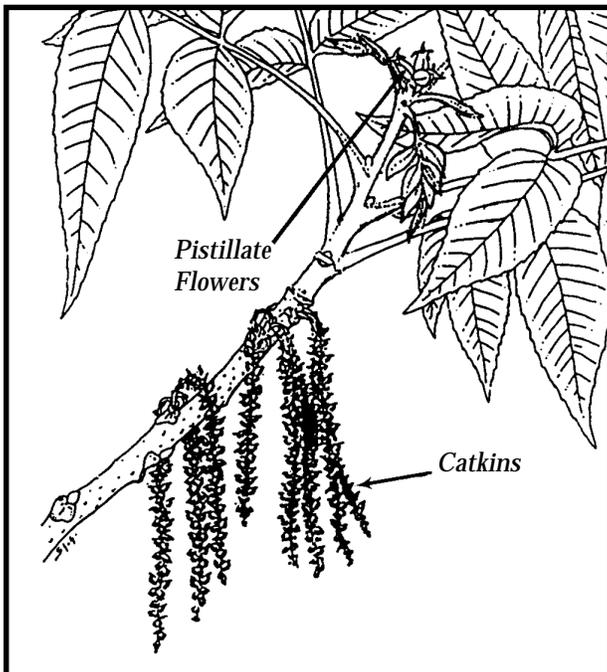


Figure 1. Catkins are borne on 1-year-old wood while pistillate flowers form at the terminals of new shoots.

**Flowering and Pollination.** Pecans have separate male and female flowers which are located on different parts of the same tree (Figure 1). Male flowers or catkins develop along 1-year-old wood soon after budbreak. The 3-4-inch long catkins first appear green, then turn yellow when shedding pollen. After all pollen is released, catkins turn brown and fall from the tree. Female flowers look like miniature pecans and develop on the end of the current season’s growth. On the tip of the pistillate flower is the stigma which may be either red, orange or green. The stigma becomes glossy with stigmatal fluid when receptive to pollen. Pollination occurs when pollen is transported by wind to the stigmatal surface.

Periods of pollen shed and stigma receptivity for a pecan cultivar usually occur at different times. Cultivars that shed their pollen before their stigmas become receptive are called “protandrous.” Cultivars with stigmas that become receptive before pollen shedding are called “protogynous.” A protandrous cultivar should be planted within 250 feet of a protogynous cultivar to ensure pollination of both cultivars. In areas where native pecan trees are abundant, pollination requirements can be met with pollen from surrounding native trees.

**Nut Size and Quality.** Nut size and quality are important criteria for selecting cultivars, especially if nuts are grown for retail sale. Extra-large pecans attract the attention of uneducated consumers who buy nuts with their eyes rather than their taste buds. Extremely large pecans are often poorly filled and dry tasting. However, educated consumers look for moderately sized nuts that are well-filled and have a sweet oily taste. High quality pecans have more than 50 percent kernel, a high oil content, and a light straw-colored kernel.

**Recommended Cultivars.** The state of Kansas can be divided into four zones of pecan cultivar adaptation (Figure 2). For best results, choose from among the cultivars recommended for your area (Table 1). For growers who like to experiment, there are several untested cultivars available

Table 1. Recommended pecan cultivars for Kansas. Cultivars are listed in order of average maturity date, from earliest to latest.

Cultivar	Adaptation Zone	Nut Weight (grams)	Percent Kernel	Flowering Habit*
Starking	1	5.8	54.3	1
Colby	1, 2, 3	6.7	42.8	2
Norton	1	6.5	44.0	2
Peruque	2, 3, 4	5.6	58.6	1
Pawnee	3, 4	9.1	50.0	1
Posey	2, 3, 4	6.5	51.6	2
Major	2, 3	5.6	48.9	1
Kanza	2, 3, 4	5.7	51.6	2
Hirschi	3, 4	6.3	48.6	1
Giles	3, 4	6.1	51.7	1
Greenriver	3, 4	6.5	49.0	2
Dooley	4	5.8	47.6	1
KS112	3, 4	5.9	56.0	2
Gratex	4	7.5	59.3	2
Maramec	4	9.2	56.7	2

\*Flowering habit: 1=Protandrous, 2=Protogynous

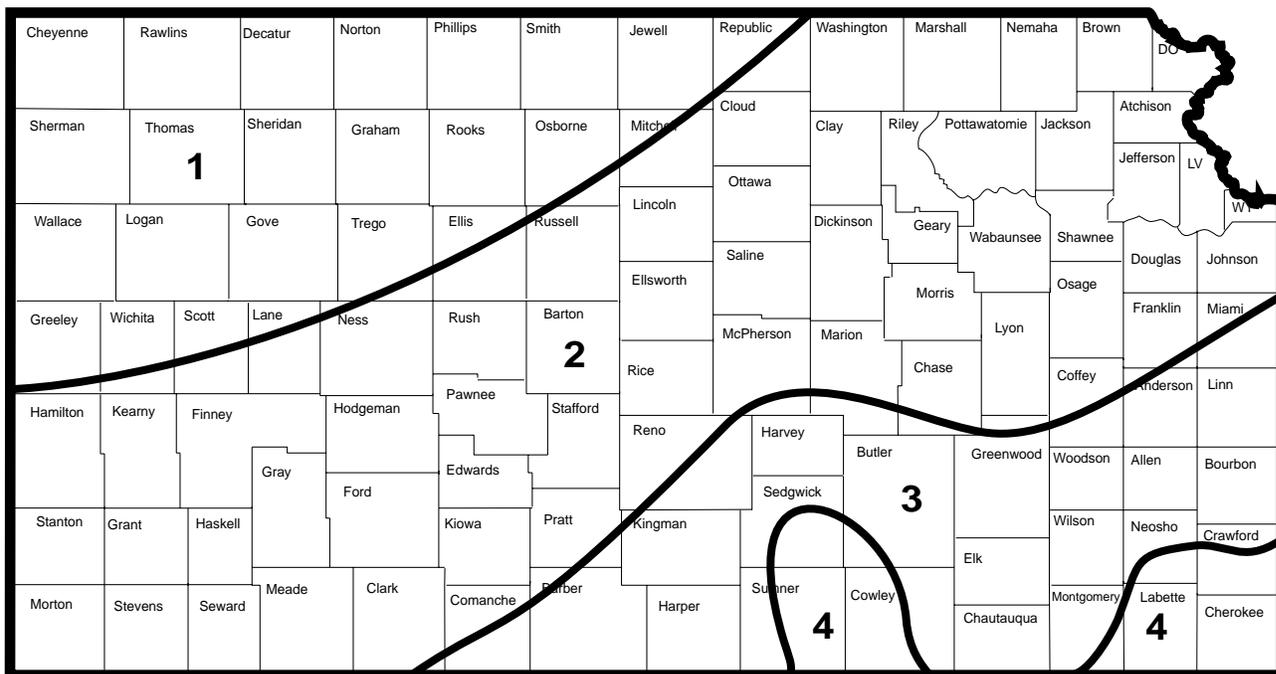


Figure 2. Kansas can be divided into four pecan cultivar adaptation zones.

for all adaptation zones. Contact Kansas State University’s Pecan Experiment Field at P.O. Box 247, Chetopa, Kansas, 67336 for additional information.

### Methods For Establishing Pecan Trees

Pecans should be given plenty of room to grow. Plant trees at least 30–35 feet apart. Pecans can be established by planting grafted trees, by planting seedling trees then grafting 2–3 years later, or by planting nuts then grafting 3–4 years later. Each method offers advantages and disadvantages. Prospective pecan growers should choose the method best suited to their skills and economic situation.

**Grafted Trees.** Transplanting grafted trees of desired cultivars is the quickest way to produce a nut crop. Trees should start to bear nuts within 5–7 years after transplanting. Many of the cultivars recommended for Kansas are not widely available from commercial nurseries, making it difficult to obtain grafted trees.

**Seedlings.** Seedling pecan trees are widely available and can be purchased from seedling nurseries or from the Kansas State and Extension Forestry Tree Program. Seedling trees must be grafted to desired cultivars 2–3 years after establishment. Nut production should begin 5–7 years after grafting. Starting a pecan planting with seedlings offers the advantages of low initial costs and the opportunity to establish cultivars not available from commercial nurseries. Disadvantages include a delay in the onset of nut production and the expense of grafting your trees.

**Nuts.** Pecan trees are easily grown from properly stratified nuts. To start your own trees, choose nuts that are medium-sized and well-filled. Nuts from early maturing northern cultivars make good cold-hardy seedlings. Stratify nuts in moist sand by placing them in layers about 3 inches deep and holding them in a cool room (35–40°F) for 90–

120 days. To ensure uniform germination after planting, keep the nuts moist throughout the stratification process.

Plant stratified seeds in the spring after the danger of frost passes. Seedlings can be grown in a nursery row and transplanted the following year or planted directly in the final tree location. Homegrown seedlings require 3–4 years to grow large enough for grafting. Starting an orchard from seed has the same advantages and disadvantages as starting with seedlings but adds another year to the establishment time.

### Transplanting Pecan Trees

Transplant both grafted trees and seedling trees in March, as soon as the soil can be easily dug. After receiving your trees, plant bareroot trees as soon as possible to prevent roots from drying. Prune each tree before planting by trimming off about 1/3 of the top growth. Prune off broken or rotten roots and cut the tap root back to 24 inches. Tap root pruning of 1-year-old seedlings is unnecessary.

Dig your planting hole large enough to fit the entire root system. Hold the tree in position and fill soil in around the roots, making sure the fibrous roots are spread out in their natural positions. The tree should be planted at the same depth as it was in the nursery. Water the tree in after transplanting. Do not place soil amendments or fertilizers in the planting hole.

Weeds must be controlled in a 3-foot area around the newly transplanted tree. For large plantings, the entire orchard should be kept free of competing vegetation. Complete vegetation control can be achieved by shallow cultivation, application of herbicides, or mulching.

If the transplanted tree makes 8–10 inches of new growth by early June, spread 1/2 cup of ammonium nitrate fertilizer around the tree over the entire weed-free area. Nitrogen applications to trees slow to establish themselves (less than 8 inches of new growth) can cause a leaf burn and should be

avoided. To ensure survival, keep the tree well watered throughout the growing season and especially during droughty periods.

### Care Of Non-bearing Trees

The goal of training a young pecan tree is to develop a strong trunk and healthy root system. Adequate soil moisture throughout the growing season and proper fertilization are keys to strong, vigorous tree growth. Water young pecan trees when conditions become dry by soaking the entire rooting zone deeply once a week. Apply nitrogen fertilizer twice a year, in March and in June, at the rate of 1 cup ammonium nitrate per inch of trunk diameter. Spread the fertilizer over the entire rooting area. Keep the area around the tree weed-free to ensure maximum benefit from water and fertilizer applications.

Tip pruning helps shape the young pecan tree and promotes the formation of a strong trunk. Tip prune in early March by clipping off 3–4 inches from all terminal growth.

When the tree starts its growth in early spring, these cuts force buds along the entire branch to break. This gives the tree a more dense appearance and greater leaf area. Tip prune again in mid-summer, but this time do not prune the central leader. Cutting all lateral branches back stops their growth and channels their photosynthetic energy into strengthening the trunk. Lower lateral branches should be left on the tree until they are an inch in diameter. Remove these lower laterals as the tree grows until you have a tree with 8 feet of clear trunk.

### Care of Bearing Trees

Healthy, vigorous trees produce the highest quantity and quality of pecans. Maintaining a strong growing tree is also the best defense against attacks from insects and diseases. Water, fertilizer, and pest control are all important for healthy tree growth.

The importance of providing adequate soil moisture throughout the growing season has been discussed. Pecans

*Table 2. A field key for identifying common pests and problems of pecan trees in Kansas.*

Time Damage Observed	Time Damage Initiated	Symptoms and Signs	Pest or Problem
April	April	New growth suddenly turns black.	Spring frost damage
April	Previous years	Witches-broom type growth that breaks bud a week before healthy branches.	Bunch disease
May	April	New leaves have shot-hole appearance.	Sawflies
May	April	Galls on leaves and stems. Galls filled with small aphid-like insects.	Pecan phylloxera
May	April	Terminal of new growth wilts. Olive-green caterpillar tunneling in pith of new shoot.	Pecan nut casebearer
June	May	Nuts abort shortly after pollination.	Lack of pollination
June	June	Olive-green caterpillars tunneling into the base of nuts. Webbing and insect frass at the base of infested nuts.	Pecan nut casebearer
June	April	Leaflets yellowish, mottled, narrowed, and crinkled. Reddish-brown spots may appear then later drop out to give leaves shot-hole appearance.	Zinc deficiency
July and September	June and August	Large white webs encasing entire branches and filled with brownish-yellow caterpillars.	Fall webworm
July and September	June and August	Entire branches defoliated by a large colony of caterpillars. Young larvae are dark red while mature larvae are black. All larvae have long white hairs.	Walnut caterpillar
July or August	July or August	Honeydew covering the surface of leaves. Small, yellow insects feeding on the underside of leaves.	Yellow pecan aphid or black margined aphid
July or August	July or August	Yellow blotches on leaves. Small, black insects feeding on the underside of leaves.	Black pecan aphid
July	May	Black lesions on leaves and nuts. Lesions may coalesce to cover entire nut. Kernel quality severely reduced.	Pecan scab
September	August	Small cream-colored caterpillars with red heads tunneling in nut shucks. Kernel quality reduced.	Hickory shuckworm
October	October	Shucks turn black suddenly and stick to nuts.	Fall freeze damage
Harvest	August	Nut kernels have black, bitter-tasting spots.	Stink bugs and plant bugs
Harvest	August	White, legless grubs feeding inside nut. Grubs exit nut through small round hole in shell after completely devouring nut kernel.	Pecan weevil

*Table 3. Equipment needed to manage pecan plantings in Kansas.*

Orchard Operation	Size of Planting			
	2–25 Trees	1–3 Acres	3–40 Acres	More than 100 acres
General use horsepower	Lawn & garden power tools	12 hp garden tractor	25 to 50 hp tractor	70 to 85 hp tractor
Planting trees	Shovel	Shovel	pto-driven soil auger	pto-driven soil auger
Weed control	Hand sprayer	Back-pack sprayer	Back-pack sprayer	5 hp garden sprayer
Orchard floor management—new orchard	Lawn mower & tiller	Garden tractor mower & tiller	Disc, harrow	Disc, harrow
Orchard floor management—mature orchard	Lawn mower	Garden tractor mower	5 ft. rotary mower	10 to 15 ft. rotary mower
Pest control—non-bearing trees	Hand sprayer	Back-pack sprayer	12 to 15 hp high-pressure sprayer	100 gal. pto-driven mist sprayer
Pest control—bearing trees	5 hp garden sprayer	12 to 15 hp high-pressure sprayer	100 gal. pto-driven mist sprayer	500 gal. pto-driven air-blast sprayer
Nut harvest	Poles to shake, hand gather	Poles to shake, tarps to catch nuts	pto trunk shaker, tarps to catch nuts	pto trunk shaker, nut harvester, cleaner

require an inch of water each week from budbreak to nut maturity. Two inches a week may be closer to optimum during the heat of the summer months. Natural rainfall can be supplemented by either flood, sprinkler, or trickle irrigation.

Annual nut production relies on annual applications of nitrogen fertilizer. Apply nitrogen just before bud-swell at the rate of 100 pounds actual nitrogen per acre. Pecans grown on upland soils require slightly higher nitrogen rates.

Rosette, a disorder caused by zinc deficiency, is a common problem if pecans are grown in soils with a pH above 7.0. Symptoms include a rosetting of the terminal growth and small, misshapen leaves. Zinc deficiency is easily corrected with four foliar applications of zinc at two-week intervals starting at leaf burst.

Insect and disease problems can severely limit the nut production of a pecan tree although no pests are serious enough to cause tree death. In Kansas, three insects pose the most serious threat to the pecan crop; pecan nut casebearer, hickory shuckworm, and pecan weevil. Pecan growers must learn how to identify the symptoms of pest damage and be able to take effective steps to control important pecan pests. Use the identification key in this bulletin to help you identify common pecan pests and problems (Table 2).

A permanent ground cover of cool-season grasses and legumes should be established in the bearing pecan orchard. Once the trees start to bear, the shading of tree canopy helps reduce the competitiveness of a ground cover. Keep this permanent ground cover mowed throughout the growing season. In the home orchard, a well-kept lawn grass serves as the ground cover.

The only pruning needed on bearing pecan trees is the removal of dead or injured limbs. In addition, remove low-hanging branches to allow free movement of people and machinery around the tree. If a pecan orchard is established at a 35-foot spacing, tree thinning will become necessary 25–30 years after grafting. Remove one-half of the trees when the branches of adjacent trees begin to overlap.

### **Equipment for the Pecan Orchard**

As with all agricultural endeavors, using the proper equipment can make pecan growing easier and more efficient. The type of equipment purchased for maintaining a pecan orchard should be proportional to the size and age of the orchard. Suggestions for the types of equipment needed for pecan orchard management are given in Table 3.

### **Harvest and Storage**

Well adapted pecan cultivars begin splitting their shucks in late September or early October. Although the nut is fully mature at this time, it is still “green” and needs to dry further before being gathered. As the nut dries, the shucks will turn brownish-black and curl back, exposing the pecan. Pecans will fall from the tree when they are fully dry—begin harvesting when the first nuts drop. At this point, you can hasten the natural drop by shaking the tree. Pick pecans off the ground as soon as possible and store in a cool, dry place.

Over 70 percent of the pecan kernel is composed of unsaturated fats which can become rancid in room temperature storage. To maintain highest nut quality, shell out all your pecans and store the kernels in the freezer. Kept frozen, pecan kernels remain fresh for two years or more.

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