Establishing a Pecan Orchard

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The decision to establish a pecan orchard should be studied carefully due to the long-term investment and extensive management strategies involved in pecan production. A well planned, organized orchard will prove to be more efficient by requiring less inputs and offering larger potential returns.

In Oklahoma, pecan production is mainly from native trees. However, several benefits are associated with planted orchards. Either cultivars or seedlings may be selected depending on the grower's goals. Straight rows in planted orchards facilitate maintenance, irrigation, and harvest. In addition, tree growth and spacing requirements can be anticipated, as well as planning for tree thinning.

Choosing the Location

Because of the permanent nature of pecans, choosing the orchard location is extremely important. Both the soil characteristics and geographical location of the orchard may determine the success of the planting.

Soil

- Native pecans are typically found growing in deep alluvial soils along rivers and streams. These alluvial soils are good for pecan production, but uplands with deep well-drained soils and proper management can also be productive.
- Soils should have at least 36 inches of aerable soil.
- The soil should also have the ability to hold large quantities of water. A permeable clayey subsoil can aid in water holding capacity without waterlogging the rooting zone. Light textured soils with low water-holding capacity require irrigation for consistent pecan production.
- The water table during wet periods should remain at least 6 feet below the soil surface. Shallow water tables limit rooting zones, which in turn limit available water during prolonged droughts.

Site

- The **terrain** should be level or gently sloping and free of areas that hold water. Pecans are more efficiently harvested and managed on nearly level ground.
- Surface **drainage** is important. Drain the surface water to leave the orchard quickly after heavy rains. If water is allowed to stand in the field, it will cause waterlogging, hence blocking off oxygen that pecan roots require in order to be productive. Eventually, such trees will decline in productivity and die.
- An area prone to frequent and long-term **flooding** should not be considered. Fall flooding can wash pecan crops down stream or make the orchard inaccessible for harvest. Flooding during April-June reduces the orchard's production potential. Flooding also decreases fertilizer efficiency, and interferes with pest and disease control.
- Gentle **slopes** help in air drainage. Disease problems are more problematic when windbreaks or low-lying land restricts air flow. Cold air settles in protected or low areas, making the site more prone to freeze problems in both the late fall and early spring. An area with steep slopes may cause erosion problems and increase hazards associated with mechanical operations.

Land Preparation

1. The first step is to take a soil sample for nutrient-supplying ability. Contact your local county extension agent for information on how to collect the sample and submit it for analysis. The test will determine the lime and fertilizer requirement (see O.S.U. Extension Fact Sheet HLA-6232, *Fertilizing Tree Fruits and Pecans*).
2. Correct any drainage problems by diverting surface water and opening up ditches for internal drainage. Assistance in planning adequate drainage can be obtained from the Natural Resource Conservation Service.
3. Remove any obstructions, trees, stumps, etc.
4. Weed control should also begin at this stage. Perennial weeds such as bermudagrass and johnsongrass should be eradicated in the tree row before planting trees. Weed competition can greatly reduce the growth and survival of young trees. Herbicide strips are beneficial for newly established orchards. Fact Sheet HLA-6242, *Weed Control in Pecans, Apples, and Peaches,* discusses methods of control.
5. If an impervious zone in the soil is present, the area should be broken or considered as available rooting depth.
6. Apply lime and non-nitrogen fertilizer based on the soil test results and the recommendations. Nitrogen fertilizer should be applied only to the extent needed by the cover crop until after the trees are growing. Because phosphorus and potassium move very slowly in the

soil, incorporating these pre-plant will provide greater accessibility to the trees. The soil pH should be 6.0 to 7.0. If necessary, apply lime and incorporate it into the soil along with other pre-plant fertilizers.

7. Green manure crops improve the soil and can also be used to reduce weed problems. Summer cover crops such as hybrid sudan grass, cow peas, or mung beans and winter cover crops such as wheat, annual ryegrass, or crimson clover may be utilized. After the orchard is established, a permanent sod such as fescue, white clover, or native annual and perennial grasses work well.
8. Irrigation improves tree establishment and can increase productivity. Trickle irrigation, movable or solid set sprinkle irrigation, or traveling gun irrigation systems all work well for pecans. If irrigation is planned, an adequate water source and properly designed system is essential. **Note:** Consult an Extension Agricultural Engineer or any other irrigation specialist before establishing an orchard.

Selecting the Right Cultivars

There is no one best cultivar. Each recommended cultivar has both strong and weak points. At least four cultivars should be planted to insure proper pollination and also to guard against crop failure. These cultivars should complement each other, especially in respect to times for shedding pollen; therefore, at least two early and two late pollen shedding cultivars should be selected. Pollinator cultivars should be within 150 feet of the cultivars to be pollinated.

The marketing program may determine the cultivars to be selected. Direct marketed pecans are usually the larger nuts. Wholesale nut prices are not dependent upon size, so smaller, hardier more consistent producing cultivars may be best for this market.

Disease resistance, earliness of budbreak, date of nut maturity, cold hardiness, kernel quality, bearing consistency, and depredator susceptibility should be considered for the particular location. Some cultivars do better in the southern areas of the state while others do best in northern Oklahoma. For example, late-maturing cultivars may be frozen in the shuck in northern areas of the state. Also, cultivars that are susceptible to pecan scab and normally require intensive spray programs in most parts of the state may be managed with minimal fungicide sprays if planted in the dry, arid regions of the state. Fact Sheet HLA-6201, *Pecan Varieties for Oklahoma,* discusses the recommended cultivars for Oklahoma.

Designing the Orchard

Planning the orchard design is important, as it provides proper pollination, ease in operations and later aids in tree thinning. The initial tree spacing recommended is 40ft x 40ft. This spacing allows 27 trees per acre. Pollinator rows should be no more than eight rows apart (320 feet) and should remain in position after tree thinning. The first thinning should be initiated between 16 and 22 years or when over 60 percent of the orchard floor is shaded at solar noon. Figure 1 shows the initial planting spacings and the subsequent thinnings. At about 25 to 35 years old, the final spacing should be 80 ft x 80 ft with seven trees per acre. Temporary trees that will be removed during the first thinning provide a good opportunity to plant cultivars that perform well when young but develop problems when older. Trees used as temporaries may tend to overbear, have weak wood, or produce poor quality nuts as the trees mature. Mohawk is a good example of a temporary tree that a grower may use.

Tree Selection and Establishment

Rootstock selection can dramatically affect tree cold hardiness. Rootstocks from northern cultivars such as Peruque or Giles or from trees native to the same or a more northern area will produce more cold-hardy trees than trees with southern rootstocks.

Orchards can be started by planting seeds in-place, planting seedling trees and then grafting them one to two years after planting, or planting grafted trees. Planting seeds in-place is not recommended because of difficulties in controlling weeds, excessive tree loss, and time to start production.

Planting seedling trees and then grafting them after they are established is a satisfactory method of establishing an orchard. The advantages include a low tree cost, availability of cold-hardy rootstocks, and a wider selection of cultivars available. These trees should be grafted 18 inches or more above the soil line to improve cold hardiness of the young trees.

Planting grafted trees has had mixed success. These trees cost substantially more than seedling trees; however, later labor and grafting costs may be avoided. One problem that frequently arises when grafted trees are planted is loss of the top from cold injury followed by resprouting from the rootstock—such trees must be regrafted. Nursery grown trees are grafted at or below the soil line, which decreases cold hardiness. Also, most nursery grown trees are on southern rootstocks, which reduce cold hardiness of the grafted top.

The most satisfactory establishment method has been use of seedling trees followed by grafting in one to two years. Both bareroot or container-grown trees are acceptable. Bareroot trees should be planted when dormant in January through March. When planting bareroot trees, have the location ready with the planting holes prepared earlier. If bareroot trees are utilized, the taproot should be trimmed to 12 to 18 inches in length with the broken lateral roots removed, and one-third to a half of the top removed. Keep the roots moist and sheltered from the wind or freezing temperatures. Container-grown trees may be planted from October to May, but may be very susceptible to drought conditions. They may be planted without modification of the root system unless the container has caused the root to curl, in which case the curled portion of the root should be removed prior to planting.

Fact Sheet HLA-6207, *Starting Pecan Trees*, provides details for planting pecan trees. For grafting information, consult Fact Sheet HLA-6217, *Collecting and Storing Pecan Propagation Wood;* HLA-6204, *Bark Grafting Pecans;* and HLA-6230, *Four-flap Grafting of Pecans.* A graftwood source list, as well as a pecan nursery listing, is available from each OSU county Extension office.

Managing the Orchard Floor

The most commonly used orchard floor management system at this time is a combination of herbicide strips beside the tree rows and sod middles between rows. This system has proven very successful in pecan orchards. A mulch layer 4 to 6 feet either side of the tree and 3 to 4 inches deep after settling has shown much promise in promoting tree growth,

especially in the first two to three years. The mulch helps conserve moisture and control weeds that compete with the trees. Wood chips, straw or other organic material can be used as mulch. Many growers also graze cattle in pecan orchards after trees are at least 12 feet tall. Properly managed grazing does not decrease pecan production. With increasing grazing restrictions involved with pesticide use, grazing is becoming increasingly more difficult. Current Report CR-6242, *Weed Control in Pecans, Apples, and Peaches,* describes some options for growers. Also, Fact Sheet HLA-6208, *Improving Native Pecan Groves,* presents a few orchard floor management strategies.

Irrigating the Young Orchard

A new orchard should be watered when planted to reduce voids. It is also important to keep the developing root zone moist for the first few years. Drip or trickle irrigation works well in establishing orchards, while growers have also used sprinklers and big gun systems successfully in established orchards. The drip irrigation systems complement orchards utilizing herbicide strips. The information sheet *Trickle Irrigation Scheduling Guide for Pecan Trees* is available from OSU county Extension offices as well as Fact Sheet BAE-1511, *Trickle Irrigation for Lawns, Gardens, and Small Orchards,* which gives some good background information.

Pest Control

Non-bearing trees need protection against leaf-eating insects and foliar diseases until production begins. Aphids, fall webworms, walnut datana and other foliage feeders should be monitored and controlled before serious damage occurs. Pecan scab may need to be controlled in susceptible cultivars. Current Report CR-6209, *Pecan Insect & Disease Control* gives times to spray, materials labeled for use, and helpful information when dealing with pests.

Fertilization

After growth begins in the spring, apply nitrogen fertilizer as recommended in Fact Sheet HLA-6232, *Fertilizing Pecan and Fruit Trees.* Young rapidly growing trees will require four to seven foliar zinc applications a year. This fact sheet also details the proper procedure for collecting leaf samples for nutrient analysis. Annual leaf analysis is extremely important in determining proper nutrient concentrations in the orchard.

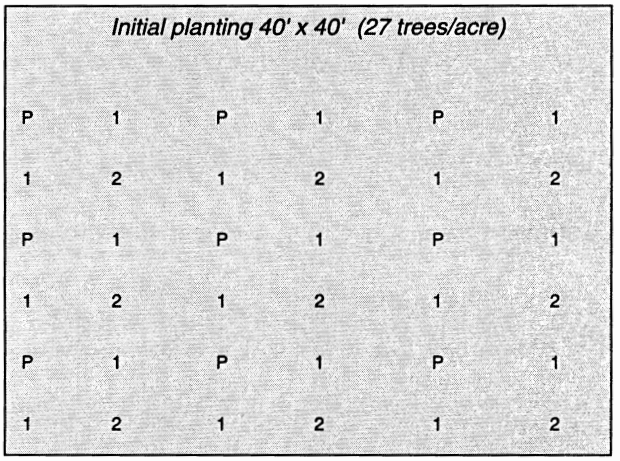
Training

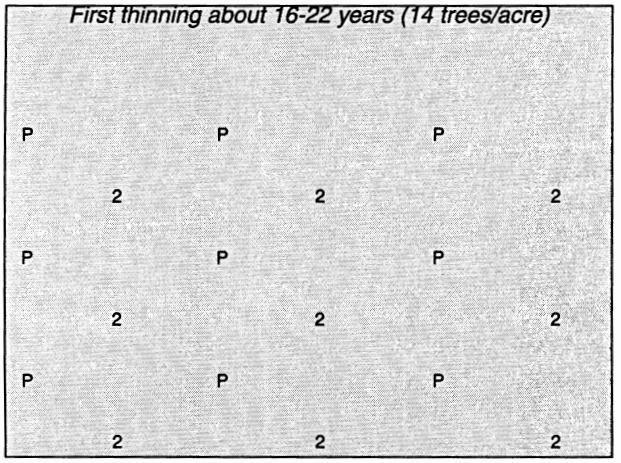
Fact Sheet #6245, *Training Pecan Trees,* details the procedures for providing the tree with the framework needed to support future wood growth and heavy croploads and also to endure the elements with minimum breakage.

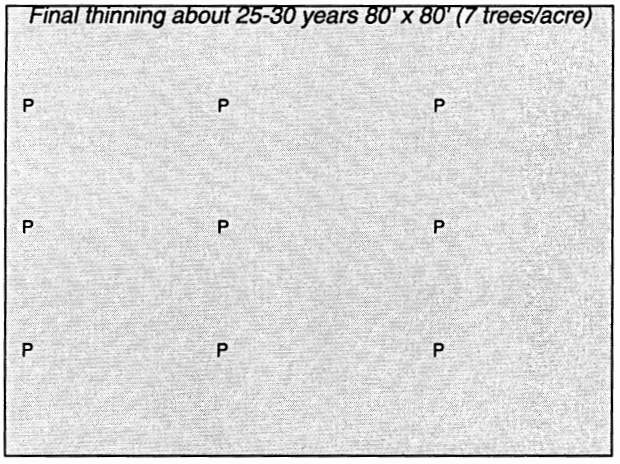
Oklahoma State University Cooperative Extension Pecan Publications

HLA-6200 *A Calendar for Pecan Growers*
HLA-6201 *Pecan Varieties For Oklahoma*
HLA-6207 *Starting Pecan Trees*
HLA-6232 *Fertilizing Pecan and Fruit Trees*
HLA-6217 *Collecting and Storing Pecan Propagation Wood*
HLA-6204 *Bark Grafting Pecans*
HLA-6230 *Four-flap Grafting of Pecans*
CR-6209 *Pecan Insect & Disease Control*
CR-6242 *Weed Control in Pecans, Apples, and Peaches*
HLA-6245 *Training Pecan Trees*
HLA-6208 *Improving Native Pecan Groves*
HLA-6250 *Use of Legumes in Pecan Orchards*
HLA-6251 *Pecan Crop Load Management*
BAE-1511 *Trickle Irrigation for Lawns, Gardens, and Small Orchards*
Information sheet *Trickle Irrigation Scheduling Guide for Pecan Trees*

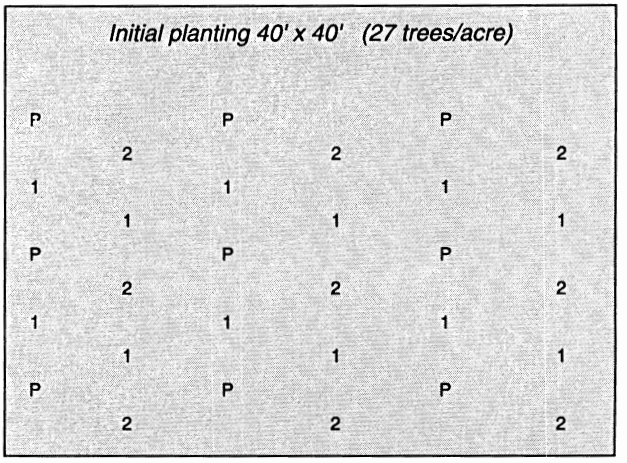
SQUARE PLANTING PLAN

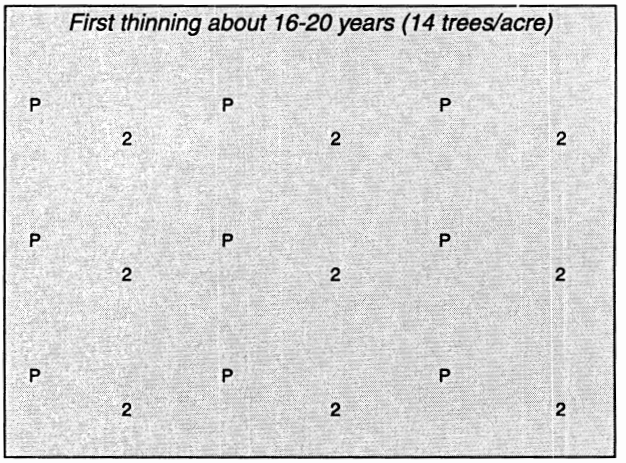


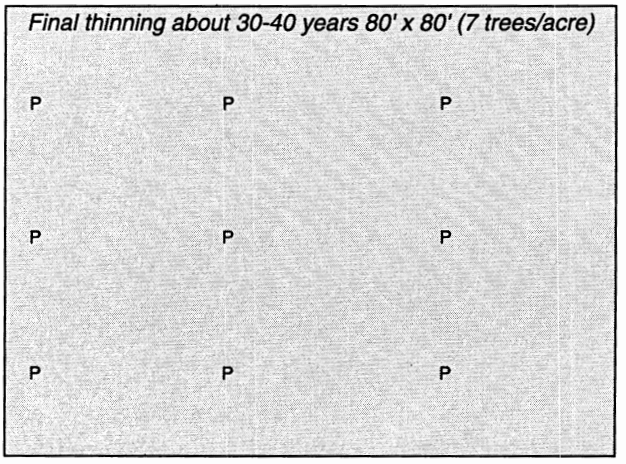




TRIANGLE PLANTING PLAN







P = Permanent tree; 1 = removed at first thinning; 2 = removed at second thinning

Figure 1.

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