



Improving Native Pecan Groves

Dean McCraw
Extension Horticulturist
Commercial Pecans and Tree Fruits

Pecans are one of few commercial agricultural crops native to the North American continent. Pecans are native to the Mississippi drainage system and are common in bottomland forest throughout central and eastern Oklahoma.

Native pecans account for 85 to 90 percent of Oklahoma's total pecan production. Many native pecan trees are located along creeks and river valleys where they are crowded by oak, elm and other species and the ground is covered with underbrush. Such competition for light, moisture and fertility often results in low yields, making it uneconomical to harvest the crop. In most situations, nut production is doubled or tripled in three years by clearing the brush and removing all trees other than pecans.

There is a considerable amount of work and expense involved in developing these native stands. In some situations, the cost and trouble will not be justified. Make sure that there are sufficient pecan trees in the stand to develop a profitable grove. If the terrain is too rough or uneven, equipment operations may be impossible in the finished grove.

Determining Proper Tree Spacing

The most important factor in improving a native pecan grove is providing adequate space for the pecan trees. When the branches of adjoining trees touch, the trees are crowded. In fact, they are badly overcrowded. Some native pecan areas remain too crowded with pecan trees after all foreign timber (weed trees) have been removed. A distance of 40 to 80 feet or more, depending upon the size of the trees, may be required between trees to allow space for a wide symmetrical top development. A space of 10 to 15 feet between branch tips of adjoining trees is a useful rule of thumb to determine proper tree spacing. Another rule is to remove trees until no more than 60 percent shade covers the grove floor at high noon during the growing season (Figure 1).

During the 1950s, Oklahoma State University pecan researcher Herman Hinrichs determined the optimum stocking rate for maximum nut production. Professor Hinrichs found that under Oklahoma growing conditions a total of about 30 square feet of cross-sectional trunk area is the optimum recommended for one acre. A tree 14 inches in diameter at 4 1/2 feet (Diameter Breast Height, or D.B.H.) above the ground contains 1.07 square feet of cross-sectional trunk area (Table 1). If all the trees in a particular area of the grove average 14 inches diameter, optimum stocking would be about 28 trees per acre (30 divided by 1.07). A larger tree 24 inches D.B.H. contains 3.14 square feet of cross-sectional trunk area; therefore, only nine trees of this size would be required per acre for optimum stocking.

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: <http://osufacts.okstate.edu>



Figure 1. A grove that has been very productive for several years. The amount of shade on the ground indicates that the grove is becoming crowded, consequently nut production can be expected to decline annually unless tree removal is initiated soon.

Of course, trees located in any area of the grove will be somewhat variable in size. To determine the stocking rate of trees on a specific acre, measure each tree located on the designated acre at 4 1/2 feet above the ground. Determine from Table 1 the cross-sectional trunk in square feet for each tree. To arrive at the total trunk area (stocking rate) for that particular acre, add together the trunk area for each tree. If the total is greater than 30, too many trees exist for optimum pecan production.

With experience it will not be necessary to utilize this time consuming measuring procedure. Most individuals are soon capable of approximating stocking rates via visual observation. Since native trees are randomly spaced, tree thinning cannot be performed by systematically removing specific rows of trees as found in formal plantings. Instead, tree removal in native groves is commonly considered on an individual basis. Symptoms of tree crowding are small leaves of light green color and early shedding of the leaves in the fall. Short shoot growth, shedding of the lower branches, and irregular, low nut production also occur.

Table 1. Tree Size Determines Space Needs

Average Tree Trunk Diameter Inches	Cross-Section Square Feet	Desirable No. Trees/Acre	Average Distance Between Trees in Feet
1-12		36	35.0
13.6	1	30	38.0
15.0	1.23	24	42.6
16.0	1.40	21	45.5
17.0	1.58	19	47.9
18.0	1.75	17	50.6
19.2	2	15	53.8
21.0	2.41	12	60.2
22.0	2.64	11	62.9
23.2	3	10	66.0
25.0	3.41	9	69.6
26.0	3.69	8	73.8
27.1	4	7.5	76.2
28.0	4.28	7	78.9
30.3	5	6	85.2
35.0	6.69	4	104.4

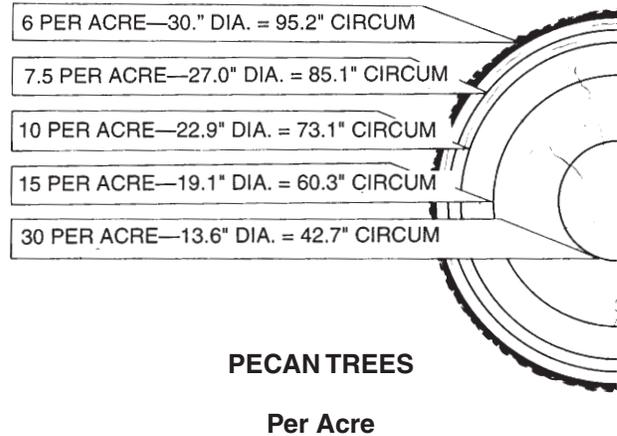
Developing the Thinning Procedure

The first step in developing a native grove is to remove all underbrush and all timber that is not pecan. Next, remove damaged and decaying pecan trees. Pecan trees that have been growing in crowded conditions will have most of the leaf-bearing area near the top of the trees. Sunscald and windbreakage may occur if a heavily forested area is thinned to 30 square feet trunk area per acre with one thinning. An alternative is to thin the area to about 40 square feet per acre. Then, over the next year or two, observe the performance of the remaining trees to determine the least desirable trees for removal at the follow-up thinning. The pecan trees will respond surprisingly fast to the increased light and decreased competition by developing vigorous new growth and by forming new branches lower down on the trunk. In the third year and beyond, the trees should be thinned to 30 square feet of cross-sectional trunk area per acre.

Each native pecan tree is a seedling and is genetically different from all other seedling pecan trees. There can be great variation in nut size, nutmeat quality, shell thickness, productivity, tendency to alternate bearing and disease resistance. It is best to know the characteristics of the trees by observing them for two or more years before thinning so that the least desirable trees can be taken out and the better trees left. Trees possessing the following undesirable characteristics are also likely candidates for removal: (1) shy producers, (2) producers of small nuts (more than 100 nuts per pound), (3) trees susceptible to pecan phylloxera, (4) trees susceptible to scab disease, and (5) those that ripen their nuts after the first average fall freeze date.

Also, consider removing hollow trees (squirrel nesting sites), trees larger than your equipment can handle, and multiple-trunked trees. Often one or more trunks can be removed and a usable tree can be salvaged from the remaining trunk.

It would be cumbersome to keep detailed written records of every tree in the orchard, but there is a relatively simple method that can help. Each fall, walk through the orchard and put a spot of spray paint on the north side of the trunk



A total of 30 square feet of trunk cross section is the maximum recommended for one acre. Measure diameter four feet above ground.

(so you know where to look for the spots later) of every tree that impresses you with its yield, size, quality, or other characteristics. After doing this for a few years, you can look at the trunk and see how many spots there are. If there are several, you would want to leave that tree in preference to a tree with few or no spots on the trunk. If the tree has no spots, then you probably would not miss it.

Removal of trees is usually done in the winter when other farm operations are less demanding. However, the best time to thin is whenever you can get to it.

Because trees in native groves are growing in no particular pattern, choosing which trees to cut can be almost as time consuming as actually removing the trees. Start in one spot and select trees for removal that you can readily see. Mark them with surveyor's tape or some other easily removable marking. Then move to the adjacent area. If a majority of the trees are to be removed, it may be more convenient and less laborious to mark the trees **to leave** instead. It is not unusual to backtrack and modify your first thinning plan. Keep working through the orchard until you finish. Then check the plan again a day or two later before starting the removal process.

It is not always possible to have a perfect arrangement of trees. Two trees with canopies touching on one side but wide open on all three other sides can be left as long as the trees are not so dramatically lopsided as to risk falling over in high winds with heavy rains or an ice storm. The time will come when you have to remove a good tree to prevent overcrowding while leaving a poor tree that is out in the open.

Thinning trees is a continual process. As soon as you give the trees more room, they will respond with vigorous growth to utilize the extra light. Within a few years, the trees will start crowding again.

Each tree that is removed may decrease the yield of the orchard temporarily. The remaining trees respond quickly and compensate for the lost yield within two to three years. It is best to do some thinning every year or two rather than waiting for several years and performing heavy thinning. It is far better to thin the trees before they become crowded.

Technical help is available to timber owners. OSU Extension Fact Sheet HLA-5000 (available at all OSU County

Extension Centers) lists some services available that can be valuable to landowners contemplating the development of pecan-timbered areas for nut production. Foresters are available to offer general timber management advice, to inventory your timber, and to determine market potential. They may also contact or provide a list of buyers and provide other marketing assistance.

After the trees for removal have been identified, moments of grief and heartbreak may be ahead for some landowners—especially those sentimentally attached to the existing trees. Some landowners develop a deep fondness and close association to their trees. In some instances this fondness might rival that which exists for cherished friends and relatives. Consequently, removal of the excess trees can be emotionally trying for the owner. In this case, it may be best for the landowner to engage a trusted party to remove the trees and for the landowner to be absent from the place while the tree removal process is performed.

Tree Removal

Mechanical

Bulldozers. Generally the entire tree is removed including the root system. Holes and low spots left are filled and the orchard floor can be left fairly level. Care should be taken not to damage the remaining trees.

An alternative method, once popular but seldom used anymore, is performed with a rigid, heavy-duty, V-shaped saw blade mounted on the front of the bulldozer (dozer saw). As the dozer is driven toward the target tree, the blade severs the tree near ground level, leaving the root system in tact. Initially this method creates less disturbance to the soil surface than whole tree removal; however, during later years, the root system decays and commonly produces holes or depressions which eventually requires filling and considerable soil leveling.

Chain saws. An advantage of this method for some landowners is that equipment and labor may be available on the farm. A disadvantage is that the root system will leave a depression as it rots away, which may eventually require backfilling and leveling. Care should be taken to avoid damage to remaining trees from falling timber, and adequate safety precautions should be followed by the operator to avoid injury. It is usually best to remove trees near ground level for ease in grove floor management or to leave the stumps 1 1/2 feet or higher so they can easily be detected and avoided during grove floor maintenance (mowing, discing, etc.).

Deadening of Trees

Trees can be killed by girdling the tree with overlapping cuts (frills) through the bark into the sapwood in a continuous circle around the tree trunk near the ground line. Herbicides can be applied to the frills, to the base of young trees, or by injection. Consult your local county agent for approved materials, and follow all label directions. Killed trees may be left to rot in place but may pose a safety hazard. After two or three years the trees should be dry enough for burning. During the dormant season the trees can be burned without damage to nearby trees. Although the area involved will be cluttered while the trees decay, it is considered an economical way to remove surplus trees.

Orchard Floor Management

Some method of soil management should be adopted as soon as the clearing is completed or briars, brush, and weeds will take over.

Clean cultivation in summer followed by a winter cover crop can be used, but any cultivation should be shallow to avoid injury to the pecan roots. Clean cultivation eliminates much competition with the trees for soil moisture and nutrients. However, clean cultivation bares the soil surface and predisposes it to wind and water erosion and makes travel through the grove during times of inclement weather difficult. Tracking, ruts, and other depressions often created under clean cultivation require additional soil leveling operations for efficient mechanical harvesting.

Conversely, a short, uniform vegetation cover in the grove provides effective mechanical harvesting conditions, although the vegetative growth may compete with the trees for moisture and nutrients during the growing season.

Cool season crops, such as fescue, ryegrass, wheat, and rye, are less competitive with the pecan trees than warm season crops that grow during the peak growing periods of the pecan tree. Bermuda, Bahia and alfalfa are crops that are highly competitive with the pecan trees.

Bermuda is very common in pecan groves throughout Oklahoma. Much of it is naturally occurring. Though the bermudagrass is competitive with the pecan trees, it can provide a favorable surface for mechanical harvesting, furnish forage for associated livestock enterprises, and provide a firm floor for vehicle travel through the grove, especially during wet seasons. Bermuda is often used in a compromise arrangement by keeping the grass mowed or grazed short during the summer growing season.

Mowing can be used to keep weeds and grasses short to reduce competition for water and nutrients. Herbicides are generally not used under native pecan trees because the irregular spacing of the trees makes it difficult to make a weed-free herbicide strip, as is used in cultivar orchards that are uniformly spaced. Treating an area under the limb spread of each tree with a herbicide can be beneficial, but this practice requires considerable hand labor and, therefore, is an unattractive alternative to many.

Grazing is often used under pecan trees and can help keep the ground cover short while providing supplemental forage for livestock. However, care should be used in selecting pest control materials since the labels of most pecan spray materials prohibit or restrict grazing in treated orchards.

Other Management

Getting adequate light to all sides of the trees by tree thinning is only one part of the management program necessary to bring a native pecan grove into full production. Water must be managed either by applying irrigation water or conserving soil moisture by controlling the ground cover. Insect, disease, and animal pests must be controlled, and the nutrient levels of the trees will need to be monitored and to have fertilizers added as needed. The best method to determine fertility needs of pecan trees is via leaf analysis. To utilize this service, contact your local county Extension center. OSU Extension Fact Sheet HLA-6232, "Fertilizing Tree Fruits and Pecans," provides fertilization details including the leaf analysis program.

Native pecan trees can be changed to variety (papershell) by topworking (grafting). For topworking, young, vigorous trees less than four inches in diameter and located no closer than 30 to 35 feet apart are preferred. Larger trees can be topworked by locating the grafts higher in the tree and farther out on individual branches where limb diameters are not larger than four inches. OSU County Extension Centers have several fact sheets available to assist with topworking pecan trees.

Pecans have a strong tendency toward alternate-year bearing while in the wild, unmanaged state. But under full management, this tendency can be minimized.

OSU Companion Publications for Native Pecan Groves

- HLA-6200 A Calendar For Pecan Growers
- HLA-6201 Pecan Varieties For Oklahoma
- HLA-6204 Bark Grafting Pecans
- HLA-6205 Splice and Tongue Grafting Pecans
- HLA-6206 Patch Budding Pecans
- CR-6209 Pecan Insect and Disease Control
- HLA-6217 Collecting and Storing Pecan Propagation Wood
- HLA-6230 Four-Flap Grafting Pecans
- HLA-6232 Fertilizing Pecan and Fruit Trees

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0606 GH.