Improving Native Pecan Groves

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Pecans are one of few commercial agricultural crops native to North America. Pecans are native to the Mississippi drainage system, but grow from Wisconsin into Mexico. Although pecans can be grown as far north as Wisconsin, there are few orchards or groves and commercial production is typically limited to Missouri and more southerly locations. Native pecans are found growing in 14 states, but the largest area of commercial native production is across Oklahoma, Texas and Mexico. Pecans in the western and southeastern states have all been introduced.

Native pecans account for 80 percent to 90 percent of Oklahoma's total pecan production. Oklahoma ranks in the top three states in native pecan production and 5th or 6th for total pecan production. Oklahoma averages 17 million pounds of pecans each year, with an average wholesale value around $18 million. From 2004-2014, native pecans have averaged $1.06 per pound, while improved varieties averaged $1.72. With proper management, a native pecan grove can average 400 pounds to 800 pounds of pecans per year. Most native pecans are sold to wholesale buyers, who use them for products like baked goods, cereals, ice creams and candies.

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 can be doubled or tripled in three years by clearing the brush and removing all trees except pecans.

People often purchase land, then realize they own pecan trees. Land owners can develop these groves to add extra income, but must make some decisions in their management plans. 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 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. If the grove is in a flood prone area, the site may be too risky to develop. Investing time and money into the flood prone grove is risky because flood waters may wash away profits during harvest.

Many native pecan groves are double-cropped, growing forage for beef cattle as well as pecan production. Cattle and pecan co-production is common in Oklahoma and must be managed together to provide the best growth for both commodities. Orchard floor maintenance, fertilization, fungicide and insecticide application may differ when livestock are involved.

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http://osufacts.okstate.edu

Removing cattle from native groves within the proper time frame before harvest or during certain pesticide applications is another item to consider in a pecan/cattle enterprise.

Determining Proper Tree Spacing

Overcrowding is often the most limiting factor in a native pecan grove. When the branches of adjoining trees touch, the trees are crowded. Some native pecan areas remain too crowded with pecan trees after all foreign timbers (weed trees) have been removed. A distance of 40 feet to 80 feet or more may be required, depending upon the size of the trees. Allow space between trees for a wide symmetrical top development. A space of 10 feet to 15 feet between branch tips of adjoining trees is a useful rule of thumb to determine proper tree spacing. Remove trees until no more than 50 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. His research indicated that with Oklahoma growing conditions, about 30 square feet of cross-sectional trunk area was the optimum tree density recommended for one acre. A tree 14 inches in diameter at

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.

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

4 1/2 feet Diameter Breast Height (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 per acre would be needed for optimum stocking.

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 4 1/2 feet above the ground that is located on the designated acre. 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, this time-consuming procedure will not be necessary. Most individuals are soon capable of approximating stocking rates with 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, irregular shaped nuts and low nut production also occur. Having properly thinned groves will be beneficial to forage growth when grazing or haying orchard floors.

Developing the Thinning Procedure

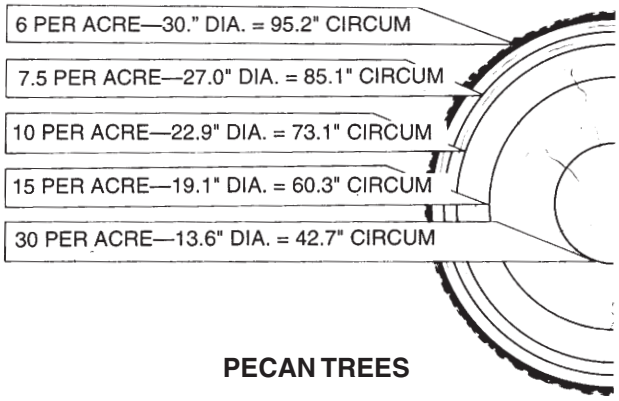
The first step in developing a native grove is to remove all underbrush and timber except pecan trees. Leave large and small pecan trees. Next, remove damaged and decaying pecan trees. Pecan trees that have been growing in crowded conditions will have most of the leaf-bearing area near the top of the trees. Sunscald and wind breakage 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, during 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 appearing lower 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 loads and disease resistance. It is best to know the characteristics of the trees by observing them for at least two years before thinning so 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. irregular bearing or poor yields
2. small nuts (more than 100 nuts per pound)
3. poor nut quality
4. susceptible to pecan phylloxera
5. susceptible to scab
6. late ripening pecans.

Also, consider removing hollow trees (squirrel nesting sites), trees larger than 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 (making them easy to find later) of every tree that is impressive with its yield, size, quality or other characteristics. After doing this for a few years, look at the trunk and see how many spots there are. If there are several, 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.



PECAN TREES

Per Acre

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

Removal of trees is usually done in the winter when other farm operations are less demanding. An ideal time is during the winter when a large crop is expected. Remaining trees will have less competition allowing them to mature good quality nuts and have a good return crop the next year. However, as time is available, it can be done any time of year.

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 work to mark the trees to leave instead. It is not unusual to backtrack and modify the first thinning plan. Keep working through the orchard until finished. Check the plan 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 down in high winds with heavy rains or an ice storm. The time will come when removal of a good tree is needed 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 three years to five years. It is best to do some thinning every year or two rather than waiting for several years when the trees are crowded and heavy thinning is required.

Technical help is available to timber owners. Extension Fact Sheet NREM-5035 "Selling Your Timber" lists some available services that can be valuable to landowners contemplating the development of trees thinned for nut production and want to sell the removed trees.

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 intact. 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.

Track hoe. Use of a track hoe is popular because they can remove trees with minimal damage to surrounding trees. Tree removal using a large track hoe is relatively fast. The track hoe can break off limbs that may damage adjoining trees. Then, with a few scoops of soil at the base of the tree, it can be pushed in the desired direction to avoid collateral damage.

Tree cutter. These are common in areas where there is extensive logging. The cutter clamps the tree trunk , then cuts it off at the base. The cutter can direct where the tree is laid or, if the tree is within its capacity, it can carry the tree to an open area and lay it down.

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 for easy be detection to avoid them during grove floor maintenance.

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, the base of young trees or by injection. Consult the local county Extension educator 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 briers, brush and weeds will overtake the area.

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.

Tall fescue is common in mature orchards, since it tolerates shade. Bermudagrass makes a good harvest surface, but dies as shading becomes prevalent. Annual grasses such as annual ryegrass, rescue grass and downy brome are common in orchards.

One option that works well with native pecan groves is to establish legumes as ground covers. Legumes offer two advantages instead of typical grass ground covers. First, legumes provide needed nitrogen, sometimes providing all the necessary nitrogen needed by the pecan trees. Secondly, certain legumes attract beneficial insects into the groves, helping to control aphid and other insect pests. Extension Fact Sheet HLA-6250 "Use of Legumes in Pecan Orchards" details the recommendations for legume selection and establishment.

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 uniformly spaced cultivar orchards. 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. Grazing livestock may be restricted by the recently enacted Food Safety Modernization Act. Producers should familiarize themselves with the provisions of this Act as they become better defined.

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. If too much water is the issue, drainage ditches or waterways should be established to divert standing surface or sub-surface water from the grove. Too much water can be detrimental to good grove health. Insects such as pecan weevil and pecan nut casebearer should be monitored and controlled, if necessary. By removing disease-susceptible trees, fewer fungicide applications are needed, but disease pressure should be carefully monitored. Pests, such as crows, bluejays, squirrels and other mammals must be controlled. The nutrient levels of the trees will need to be monitored, and fertilizers applied as needed. The best method to determine fertility needs of pecan trees is via leaf analysis. To utilize this service, contact the local county Extension office. 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 improved varieties by topworking (grafting). Grafting young trees to low maintenance varieties or superior native selections often will help with improving production, kernel percentage and quality of the grove without additional inputs needed in large fruited varieties. Select young, vigorous trees less than four inches in diameter and located no closer than 40 feet apart, if available. 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 six inches. Oklahoma Cooperative Extension Service has several fact sheets available to assist with grafting pecan trees. The Oklahoma Pecan Management website has links to these fact sheets - http://okpecans.okstate.edu/orchard-establishment-management.

Pecans have a strong tendency toward alternate-year bearing while in a wild, unmanaged state. With full management, this tendency can be minimized. Thinning the grove, improving drainage, fertilization, orchard floor management and grafting are investments that will improve the grove for the long term.

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
HLA-6250	Use of Legumes in Pecan Orchards
EPP-7079	Pecan Weevil Biology and Control
EPP-7189	Pecan Nut Casebearer
EPP-7190	Monitoring for Pecan Weevil

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