Hedge Pruning Pecan Trees

in the Southeastern U.S.

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EXTENSION

As pecan trees grow in orchards, their tree canopies encroach upon one another, causing excessive shading that can increase alternate bearing intensity and reduce tree health and orchard profitability. Historically, limb pruning and tree removal have been the most common methods of dealing with this problem, particularly in the low-light environment of the southeastern U.S. Mechanical hedge pruning has been used successfully in high-light environments to mitigate the effects of orchard shading, and it has become the standard method used for this purpose in the arid production regions of the western U.S.

The southeastern U.S. is a relatively low-light environment, exhibiting significant cloud cover and atmospheric water vapor throughout the growing season, which can further limit sunlight in orchard systems. Mechanical hedge pruning offers a solution to this problem, which can also help minimize issues related to pecan scab, hurricanes, tropical storms, and alternate bearing.

Benefits of Hedge Pruning

Sunlight Management and Less Overcrowding

Pecan trees thrive on sunlight, which is necessary for photosynthesis. Hedge pruning systematically removes a quarter to half of the tree canopy at a time, opening entire orchards up to more sunlight (Figure 1). As trees receive more adequate sunlight, photosynthesis is improved and they remain healthy and vigorous even at tighter-than-normal spacings as they age. Trees must be hedge pruned on a regular basis once a hedging program has begun. If trees at tight spacings (less than 40 ft between rows) are not hedge pruned by years 7 or 8, enough shading can occur to inhibit fruit production (Figure 2). Some portion of an orchard is usually hedged in 3 out of 4 years.

Figure 1. A hedge-pruned orchard (top) and a non-hedge-pruned orchard (bottom) of the same age and cultivar.

Improved Spray Coverage

Insect and disease pressure in Georgia pecan orchards can be intense on many commercial cultivars. Sprayer coverage is one of the greatest difficulties in managing these issues on large trees. Pecans are sprayed with air-blast sprayers that use a large fan to blow the spray mixture up into the trees. Research has shown that even the best sprayers will not consistently deliver chemicals into the upper canopy of large trees (more than about 40 ft high) in a way that provides suitable coverage for optimal protection of the nuts. Pecan trees carry the highest percentage of nuts in their canopies, making effective canopy coverage a high priority. By reducing the height of pecan trees to no more than 40 ft, hedge pruning ensures adequate spray coverage of the upper tree canopy and provides effective control of target pests and diseases.

Improved Pecan Quality and Enhancement of Pecan Tree Water Status

Most research on hedging pecan trees has not consistently shown a dramatic increase in yield in the form of crop volume, but pecan quality is consistently enhanced by hedge pruning. Removing large portions of the tree canopy reduces the percentage of large limbs that comprise a tree's structure. This reduces the energy and resource demand on the tree to maintain an extensive tree structure, allowing it to shift those resources to nut production. Water is the primary factor controlling nut size. Well-irrigated trees consistently produce larger pecans and nuts with a higher percentage of kernel meat inside

Figure 2. Waiting too long to hedge prune at tight row spacing allows too much shading, which results in dead limbs and reduced production.

than do poorly irrigated or nonirrigated trees. Research has shown that the water status of hedged pecan trees is significantly improved throughout the growing season compared to nonhedged trees under the same irrigation regime. This means that the trees are under less water stress, allowing them to function properly to produce their crop. Additionally, the larger the crop load, the more difficulty trees have in sizing and filling out the pecans. Hedge pruning increases trees' ability to produce optimal quality pecans by reducing their canopies and managing crop loads.

Reduced Storm and Wind Damage

The southeastern U.S., including Georgia, is subject to damaging winds in the form of thunderstorms, tropical storms, and hurricanes that rise from the Gulf of Mexico and from the Atlantic Ocean. Pecan trees are particularly vulnerable to these storms because they often occur late in the summer when the trees are bearing a heavy crop load. The large canopy of the trees catches the wind and may blow trees down or break long, heavy limbs. More compact hedged trees provide less wind resistance. When the size of trees is reduced, they present a smaller canopy to the wind and long, easily broken limbs are eliminated. Hedge pruning can reduce storm and wind damage in the form of fallen trees and large, broken limbs by as much as 60%.

When to Begin Hedge Pruning

There is no single answer to the question of how early to begin hedge pruning pecan trees. At wider spacings (40–60 ft), producers can wait until sometime between years 12–15 to begin hedging. This allows 5–8 years of commercial yields before the hedging process begins. At tighter spacings, producers will need to start hedging much earlier. Orchards with row spacings of 25–30 ft should be hedged no later than year 7. Spacings of 35 ft can usually wait until around years 9–11. The exact time to begin hedging varies and depends on tree growth and size as influenced by cultivar and tree spacing more than by tree age. Hedge pruning will remove fruiting wood, but the yield loss is negligible when hedging is done on time. The earlier the initial hedging is done in the life of an orchard, the smaller the cuts that are made.

Hedge Pruning Methods

Side cuts should be made about 6–7 ft from the center of tree trunks. This usually places the blades of the machine just inside the herbicide strip or at the interface of grass and bare dirt. If there has been adequate sunlight in an orchard to that point, there should be enough fruiting wood on the interior of the canopy to largely offset the loss of what is removed.

Top pruning should be done at a 40–50° angle, depending on height of the trees. The optimal height at which to top the trees is usually determined by row spacing. A general rule of thumb is to top them at the same height as the row width, up to 40 ft (Figure 3). If rows are spaced less than 40 ft, trees should be topped at a maximum height equal to the row width. For example, if row width is 30 ft, the tree height should be topped at 30 ft. Orchards at row spacings wider than 40 ft should be topped no higher than 40 ft because that is the maximum height limit at which adequate coverage can be attained with an air-blast sprayer.

Research has shown that hedging trees on a north-south orientation consistently generates higher yields as compared to hedging trees on an east-west orientation. Thus, regardless of which direction the rows are oriented, hedging north to south is advised.

Figure 3. A pecan orchard planted at a 40 ft x 40 ft spacing, topped at 40 ft.

Figure 4. Hedge pruning both sides and the top of every fourth row.

The most common hedging cycles are undertaken at 3–4-year intervals on a given surface. This can be done by hedging every third or fourth row in an orchard (both sides of the tree) or by hedging every other middle (one side of each row along the middles).

When every other middle is hedged, the sides and top (of the hedged side) of the trees are cut. With this pattern, you are hedging half of the orchard at one time. This allows the entire orchard to be brought into the hedging system within as little as 2 years. Producers commonly hedge every other middle in year 1, hedge the opposite middles in year 2, skip hedging in year 3, and start back over during year 4 on the side the initial cut was made. Some producers prefer to skip a year following the initial hedging of every other middle after the first year and then resume in the third year; however, we have observed no significant differences in yield comparing the more aggressive hedging approach with nonhedged trees.

Some producers prefer to hedge the top and both sides of every fourth row in year 1, hedge the next row in year 2, the following row in year 3, and the following row in year 4 (Figure 4). Thus, it takes 4 years to get the entire orchard into a hedging system and you only hedge one-fourth of the orchard at a time. There are no real differences between the two patterns, and the choice comes down to grower preference. Many producers are often concerned with removing too much fruiting wood in the beginning, but trials and grower experience have demonstrated that this is not the case when initially hedging trees 20–30 years old and younger.

Figure 5. Hedge pruning large, mature trees can result in removal of large diameter limbs, which can damage equipment and requires a longer time period following pruning for the trees to resume commercial production.

Figure 6. Hedge pruning equipment utilized for pruning large, mature trees.

Large trees of 50 years and older can still be hedge pruned but there are some issues to consider. First, initial hedging of large, older trees requires making larger cuts (Figure 5). This practice can be damaging to equipment, such as traditional Tol hedgers, that are not designed to cut trees that large. This can also result in excessive downtime from repairing the equipment. A giraffe hedger with a single, long boom (often used by highway departments) or a large hedging boom mounted to a trackhoe is much more suitable for cutting large trees (Figure 6). Another issue with hedging older trees is that a greater percentage of the fruiting wood is inevitably removed. Because big trees tend to be overcrowded and, as a result, have very little fruiting wood on the interior of the canopy, removal of large limbs can take the trees out of production on the cut face of the tree for a longer period of time than would be observed for a smaller tree. In this scenario, one must wait for the development of new fruiting wood as a result of increased sunlight penetration following hedging. Hedging is much more conveniently employed on younger trees, which can be easily maintained at a smaller height from that point forward.

What Time of Year to Hedge

Pecan tree hedge pruning can be conducted from dormancy (December/January) through the month of June. Hedging by the end of June provides enough time for regrowth on trees that can potentially fruit the following year (Figure 7). Whether pruning occurs during the dormant season or in summer, nonfruiting shoots develop from the cut surface in the year of pruning. The following year, depending on cultivar, approximately half of the shoots that developed from the cut surface will bear fruit, and about 80% of those shoots bear fruit the next year. Dormant-season hedging will likely be a better choice than summer hedging for most producers, primarily for logistical reasons. If one hedges in summer and the debris is too large to mow over, it must be removed from the orchard. This will require time and labor, which could be better used for spraying trees, mowing, spraying weeds, repairing irrigation, etc. This may not be a significant problem for large growers with adequate labor and equipment; however, the time management may be challenging for smaller producers.

Figure 7. Lime green regrowth on pecan trees 1 month after summer hedge pruning.

The primary advantage of summer hedging is that the resulting shoot length from regrowth is significantly shorter than that for dormant hedging. Dormant-season hedge pruning results in shoot growth from 3–8 ft in length (Figure 8a) because the shoots grow for an entire season. Summer pruning, which only allow shoots to grow for about half the season, results in 8–32 in. of regrowth (Figure 8b). This is an advantage and can potentially allow producers a longer period between pruning cuts, which can save in hedging costs.

Hedging to Manage Crop Land

Another option for hedging is to use it solely as a tool for crop-load management. The other benefits of hedging will then come along as a byproduct. With this goal in mind, hedge in the on-year based on how much of the crop load needs to be removed. This may require hedging only one side of the row in the dormant season before an expected on-year and again on another face of the tree (top and or alternate side) in summer if the crop load is still too heavy. Alternatively, one can wait and hedge in June after crop load is evaluated. This provides more control over the amount of crop removed than mechanical fruit thinning and there is less risk of damaging the tree.

Figure 8a. Regrowth 1 year following dormant-season hedge pruning.

Figure 8b. Regrowth 1 year following summer hedge pruning.

Once an orchard is fully into a hedge pruning program, hedging based on crop load is likely ideal as yield increases can be potentially limited with each successive hedging. One goal of hedge pruning is to stabilize production so that 'on' crop years are slightly reduced and 'off' crop years are larger. This requires experience in gauging exactly when, how often, and how much of the tree to remove.

Summary

Mechanical hedge pruning offers many advantages for pecan production. These include increasing the trees' access to adequate sunlight, reduced tree size, enhanced sprayer coverage, improved water efficiency, greater resistance to wind damage, an increase in nut size and percent kernel, and crop load management. There are multiple patterns for hedge pruning which can be employed based on grower preference, row spacing, tree age, cultivar, and other cultural management factors. Hedge pruning should be conducted during the dormant season or, if summer hedging is employed, prior to July.

Reference

Wells, M. L. (2018). Mechanical hedge pruning affects nut size, nut quality, wind damage, and stem water potential of pecan in humid conditions. *HortScience, 53*(8), 1203–1207. https://doi.org/10.21273/HORTSCI13217-18

The permalink for this UGA Extension publication is extension.uga.edu/publications/detail.html?number=B1557

Bulletin 1557 **October 2023**

Published by the University of Georgia in cooperation with Fort Valley State University, the U.S. Department of Agriculture, and counties of the state. For more information, contact your local UGA Cooperative Extension office.