



# OKLAHOMA PECAN GROWERS ASSOCIATION

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Michael Smith, Editor

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## In This Issue

- *Annual Meeting & Show* - pg. 1
- *Pecan Recall* - pg. 1
- *Resurgence in Pecan Research?*  
- pg. 1
- *Horticulture Pecan Research  
Endowment* - pg. 3
- *Uncommon Foliar Diseases of  
Pecan* - pg. 4
- *Cold Damage?* - pg. 5
- *Pruning for Orchard Longevity*  
- pg. 6
- *Classified Ads* - pg. 8
- *Pecan Graftwood Source List*  
- pg. 9
- *Membership Application* - pg. 10



## Annual Meeting and Show

Mark your calendars to attend the Oklahoma Pecan Growers' Association Annual Meeting and Show on June 20 – 22 at the Marriott Spring Hill Suites and Ardmore Convention Center. The program is currently being planned and suggestions for topics and speakers are welcome. Contact Mike Smith at 405-744-6463 or [mike.smith@okstate.edu](mailto:mike.smith@okstate.edu) to recommend a topic or speaker.

## Pecan Recall

General Mills announced July 8, 2009 a voluntary recall of a limited quantity of “Nut Lovers” flavor Nature Valley Granola Nut Clusters product containing pecans. No illnesses have been reported in connection with the “Nut Lovers” Granola Nut Clusters product, and no other types, varieties or flavors of Nature Valley products are being recalled.

This action was taken as a precaution because pecans received from a supplier and used in the product may be tainted with salmonella. No other types of nuts were impacted. The product is sold in grocery stores, convenience stores and vending outlets nationally.

Salmonella is an organism that can cause serious and sometimes fatal infections, particularly in young children, the elderly and people with weakened immune systems. Healthy people infected with salmonella often experience fever, diarrhea, nausea, vomiting and/or abdominal pain.

## Resurgence in Pecan Research? Recap of the 2009 American Society for Horticultural Science National Meeting in St. Louis.

*Eric T. Stafne, OSU Horticulture & Landscape Architecture*

Three years ago I lamented the lack of pecan research presented at the American Society for Horticultural Science (ASHS) national meeting held in New Orleans. There we were, in the heart of pecan country, and only 4 papers were presented. That was then and this is now. A total of 11 presentations were made at the ASHS meeting in 2009. Interest in all nut crops appeared to be very high, with walnuts, chestnuts, cashews, and macadamia nuts also surfacing in papers. Here is a recap of the pecan papers presented:

Nut Crops of the Midwest

*Michelle Warmund*

University of Missouri

Dr. Warmund gave an overview of the native nut crops in the midwest. Being from Missouri she focused on the northern pecans, emphasizing the smaller

nut and kernel size, higher kernel oil content, thicker shells, and lower yields. She also stated that at the University of Missouri Horticulture and Agroforestry Research Center there are 110 northern pecan genotypes currently under evaluation.

#### Organic Production of Pecans

*Joe M. Bradford and Larry M. Zibilske*

USDA-ARS, Weslaco, Texas

Bradford and Zibilske are focusing on organic pecan production in Texas. Soil nutrients and soil microbes play an important role in pecan production because balance of these soil conditions will lead to improved tree health and a greater capacity to fend off pests. They also applied compost tea through the irrigation system and as a foliar spray. For fertilizer they used poultry litter. Results from the study show that an improvement in yield is possible with use of compost tea and other organic treatments; however, they strongly emphasized that one must utilize all available components to control pests and that lacking even one can result in failure.

#### Water Relations and Net Carbon Assimilation Rate Response in Two Commonly Used Pecan Rootstocks

*Leonardo Lombardini and Astrid Volder*

Texas A&M

*Hermann Restrepo Diaz*

National University of Colombia, Bogota

This study looked at two different rootstocks, 'Apache' seedlings and 'Elliott' seedlings. Traditionally, 'Apache' is recommended for west Texas and 'Elliott' for east Texas, but physiological reasons for that have not previously been examined. Several measurements related to photosynthesis and water use were taken to identify reasons for different performance in these regions. They found that there was very little difference between the two rootstock types in terms of gas exchange (photosynthesis) and water relations. Therefore, more study needs to be done to identify potential causes.

#### ReTain Can Increase Nutmeat Yield of Pecan Trees

*Bruce Wood*

USDA-ARS, Byron, Georgia

*Richard Heerema*

New Mexico State University

ReTain is a natural ethylene inhibitor that can reduce nut drop. 'Desirable' is a cultivar that experiences nut drop. This study found that ReTain can substantially reduce nut drop in 'Desirable' and that percent nut retention increased with crop load. Timing of application was also important,

as efficacy was best when applied soon after stigma receptivity stopped. ReTain also did not negatively affect kernel quality or percentage.

#### Mechanical Fruit Thinning Enhances Production of Cape Fear and Sumner Pecan

*Lenny Wells*

University of Georgia

A practice that is well known in Oklahoma, crop load thinning, was tried in Georgia on 'Cape Fear' and 'Sumner'. Crop load thinning was effective. Return crop and return crop value in the Off year was enhanced by thinning in the On year, thus leading to increased profitability due to higher prices and yields in the Off year. Another benefit was a reduction in vivipary for 'Cape Fear'. Crop load thinning reduced vivipary by 29%.

#### Pecan Shell Mulch Affects Peach Tree Growth, Yield, and Survival

*Eric T. Stafne and Becky Carroll*

Oklahoma State University

*Charles Rohla*

Noble Foundation

Pecan shells are typically a waste product, but they can be used for other outlets such as mulch. Fruit growers often have trouble suppressing weeds in their orchards, so if pecan shells could be used as an alternative it may enhance orchard sustainability. 'Loring' peach trees were used in this study and 5 treatments were evaluated: no weed control (mow only), RoundUp control, 2 inch deep mulch, 4 inch deep mulch, and 6 inch deep mulch. All mulches were 6 ft by 6 ft squares with the tree in the center. After 3 years of study, the treatment with no weed control was the worst and the others were similar. Therefore pecan mulch could be used as a viable alternative to spraying RoundUp. One potential issue was tree death. Deeper mulch leads to more tree death, which could be caused by allelopathy, excessive rainfall during 2007, or a combination of both.

#### Relationship of Leaf Necrosis and Defoliation to Phosphorus and Potassium Concentrations in Selected Tissue and to Certain Fruit Quality Parameters

*Michael W. Smith*

Oklahoma State University

Potassium and phosphorus play important roles in nut development. Potassium decreases rapidly in leaves and starts to accumulate in the fruit roughly 75 days before ripening, whereas phosphorus starts to move to the fruit about 30 days before shuck split. In this study leaf necro-

sis ratings were taken as well as leaf and fruit samples. Leaf necrosis ratings were negatively correlated to weight of the nut, weight of the kernel, phosphorus concentration in kernel, shuck, and leaf, and potassium concentration in kernel and leaf. Leaf phosphorus concentration was found to be a good predictor of shuck and kernel phosphorus concentration. Overall it appears that phosphorus has a greater impact on leaf necrosis and fruit weight parameters than potassium.

#### Foliar Application of Nickel and Copper on Pecan Performance

*Pradeep Wagle and Michael W. Smith*

Oklahoma State University

*Bruce Wood and Charles Reilly*

USDA-ARS, Byron, Georgia

*Charles Rohla*

Noble Foundation

Nitrogen is a critical element for pecan trees, especially early in the spring when they are actively growing. The conversion of nitrogen to forms that can be translocated throughout the tree can be inhibited by nickel deficiencies. Yet, high levels of nitrogen can cause copper deficiency as well. In this study, copper, nickel and a copper/nickel combination were applied as a foliar spray in early spring with two subsequent sprays two weeks apart following the first spray. Many measured factors were not affected by the sprays; however, it was found that foliar nickel application was beneficial and copper was not. Results also indicated that combining zinc, nickel, and copper in a foliar application may reduce yields.

#### Harvest Date, Cultivar, and Nut Filling on Vivipary Levels of Pecan Trees Growing in Warm Climate in Northwest Mexico

*Humberto Nunez*

University of Arizona

*Arnulfo Marquez-Cervantes and*

*Gerardo Martinez Diaz*

INIFAP, Hermosillo, Sonora

Vivipary is a problem in northwest Mexico pecan production. The results of this study indicated that vivipary levels in 'Wichita' was higher than in 'Western', but embryo rot was higher in 'Western' than 'Wichita'. Overall, cultivar, year of harvest, and date of harvest influenced the commercial nut quality and nut filling affected vivipary.

#### Partitioning of Phosphorus and Potassium in Pecan Trees in Relation to Annual Crop Intensity

*Michael W. Smith*

#### Oklahoma State University

Pecan trees in three years with three different crop intensities (little to no crop, small crop, and optimal to excess crop) were evaluated with relation to phosphorus and potassium. Trees with optimal to excess crop accumulated more phosphorus and potassium in July than those with small or no crop. Overall, potassium and phosphorus content increased from budbreak until July then decreased until budbreak of the following year. Leaves were important sources of potassium and phosphorus for developing fruit. When shuck split starts, potassium transport to the fruit stops, but leaf potassium is replenished before leaf drop. Phosphorus transport to the fruit started after fruit expansion and again after the start of shuck split. Leaf phosphorus declined until leaf drop.

#### Evaluation of Several Pecan Cultivars and Selections as Immature Trees in Southern Georgia

*Patrick Conner*

University of Georgia

Eleven different genotypes were evaluated over a seven year period to assess yield, nut quality, leaf and nut scab, black aphid damage, and sooty mold. Other phenological traits were also recorded. Two genotypes (USDA 86-3-666 and USDA 86-3-32) were found to have poor kernel quality and susceptible to scab. 'Jenkins' also had poor kernel quality. 'McMillan' and 'Excel' had scab resistance, but lower yields. 'Cherryle' had good quality nuts, but low yields. 'Nacono' had excellent quality nuts and good yields, but scab susceptibility was too high for Georgia. 'Zinner' had good yields and excellent quality nuts. 'Desirable' and 'Stuart' were used as the check cultivars for comparison.

So, there it is, the recap of the 2009 ASHS meeting. I was pleased to see so much effort being put into pecan research and you should be as well. Specialty crops, like pecans, are a focus of a national effort to increase research and I think we are beginning to see the beginning efforts of that initiative.

#### Horticulture Pecan Research Endowment

*Michael Smith*

*OSU Horticulture & Landscape Architecture*

As of this writing contributions total \$56,650, and the Oklahoma Pecan Growers' Association has pledged \$20,000. This is your opportunity to make a difference in the future of Oklahoma pecans and O.S.U. research and education. Creation of an Endowed Professorship

will ensure that pecan research at O.S.U. continues indefinitely. Remember, our goal is to reach \$250,000 to get matching funds from the T. Boone Pickens gift and the State of Oklahoma. Checks should be made out to the **O.S.U. Foundation** and mailed to **Michael Smith, Department of Horticulture and Landscape Architecture, 358 Agricultural Hall, Oklahoma State University, Stillwater, OK 74078-6027**. Contributions to the Endowment are tax deductible.

Below is a list of those contributing to the Endowment.

2008

- Paul and Maxine Haydon
- Bert and Elizabeth Blumer
- J.D. and Dwayne Scott
- G.F. Parsons
- Edward L. Boyd, Jr.
- John Barnes
- Henry Bellmon
- Alvin and Debra Stein
- Michael and Carole Smith
- Virginia Merritt Autry
- Tim Montz
- Bag-A-Nut, LLC

2009

- Joe Ihle
- Diane Couch
- Terry D. Powell
- George Carlson
- Dean McCraw
- Carole and Max Matheson
- Bill Ault
- Glenn Taylor
- Williams Companies
- Paul and Maxine Haydon

2010

- Michael and Carole Smith

**Uncommon Foliar Diseases of Pecan**  
**Damon Smith**  
**OSU Entomology & Plant Pathology**

Happy New Year! Welcome to a new decade. I hope that the 2009 pecan growing season was productive for you.

As I considered a topic to write about for this iteration of the newsletter, I began thinking about the rather odd

weather that we experienced for most of the 2009 year. At the Cimarron Valley Research Station located in Perkins Oklahoma, rainfall in April seemed consistent providing decent amounts of water for the trees in our research plots, but also creating an environment that was conducive for scab development. We also experienced large amounts of rain at the research station in July (5.15") and August (5.19"). Considering this issue, the fact that we included non-sprayed check plots in our pecan scab experiments, and the fact that it was so wet, we observed several uncommon foliar diseases on our pecan scab research trees. Brown leaf spot and downy spot were not prolific in our research orchards, however, we observed these diseases consistently on several trees especially in non-sprayed check plots.

Brown spot is a minor leaf disease that is caused by the fungus *Sirosporium diffusum*. Symptoms include circular to somewhat angular rust-brown leaf spots on either surface of the leaflet (Figure 1). Older spots can develop a gray color. Leaf spots can be as large as half an inch or more and spread across leaflet veins. In well-managed orchards this disease will not be an issue. Only on limbs where fungicide is not applied, in years when weather is highly conducive, and/or in orchards that are not properly managed will this disease be present.

In our research plots the largest incidence of brown spot was indeed observed in the plots where fungicide was not applied. A few limb terminals on trees where fungicide was applied were also observed with brown spot. This is likely due to inconsistent fungicide coverage during the spraying process. A carefully applied, complete fungicide program directed at scab will be sufficient to limit damage by brown spot.

Downy spot caused by the fungus *Mycosphaerella caryigena* is also considered a minor foliar disease of pe-



**Figure 1. Symptoms of brown leaf spot on pecan leaflets.**  
Photo Credit: University of Georgia Plant Pathology Archive, [www.bugwood.org](http://www.bugwood.org).



**Figure 2. Symptoms of downy spot on a pecan leaflet. Photo Credit: George Driever and**

cans. Downy spot was first observed in Georgia in the early 20<sup>th</sup> century. In wet climates, or during periods that are abnormally wet, downy spot can be severe and cause leaf defoliation. Symptoms manifest as small, circular, yellow spots on the lower surface of the leaves (Figure 2). The spots may be covered by white fungal material. On the upper surface of the leaves, the spots will appear golden brown in color. The most widely accepted dogma is that infections occur as a result of spores produced on leaves infected in the previous year (e.g. leaf litter). The infections are most likely to occur from budbreak to nut set, especially during wet weather. Symptoms may not be observed for a month or more after infection. If significant defoliation results from downy mildew, nut quality can be reduced and fewer female flowers may be present in the following season. The disease is easily managed, however, by routine fungicide applications for control of scab. Pre-pollination applications of fungicide are especially important for management of downy spot due to the susceptibility of pecans early in the season and the high likelihood of fungal spore dispersal during this period.

While both of these diseases are not common, it is important to be aware of them in years that might be conducive for their development. Be sure to maintain a sound fungicide application program for the management of scab. Use the Oklahoma Agweather Pecan Scab Advisor (<http://agweather.mesonet.org/index.php/data/section/hort>) or a calendar-based fungicide program for scheduling fungicide applications. If periods of wet weather are forecasted, be sure to apply fungicides prior to the weather event

(preventatively); or verify that fungicides have been applied recently, as the infections of most fungal pathogens will coincide with wet weather events.

### **Cold Damage?**

*Michael Smith*

*OSU Horticulture & Landscape Architecture*

Oklahoma, known for extremes in weather conditions, did not disappoint those wishing for a white Christmas. On Christmas Eve many Oklahoman's experienced blizzard conditions. Near my home visibility dropped to about 100 feet during the worst of the blizzard. Unfortunately, Carole and I had to drive home during the start of the inclement weather increasing a 45 minute drive to two hours, but we arrived without incident before the worst conditions hit. The storm was followed by freezing temperatures that persisted through 11 January. The lowest temperature experienced generally ranged from slightly below 0 °F to single digits, depending on the location within the state (Fig. 1).

It has been several years since we've experienced temperatures this low. One concern is the likelihood of tree injury caused by low temperatures. I believe it is unlikely that any damage resulted from this event. Low temperatures initially were in the mid and low 20's combined with highs in 30's (Fig. 1). These temperatures stimulated trees to gain cold hardiness, but were unlikely to cause damage. Temperatures continued to drop with time, but the extended cold temperatures allowed trees time to gain sufficient hardiness to withstand the minimum exposure temperature.

The likelihood of tree damage depends on the minimum exposure temperature, duration of exposure to the minimum temperature, previous exposure temperatures and photoperiods, and the physiological state of the tree. During the summer, trees are not cold hardy, but as day lengths shorten in the fall a pigment system in the leaves detects the changing day length providing the first signal for trees to initiate changes leading to cold acclimation. Trees defoliated prematurely will be more susceptible to fall cold injury than those that retained foliage until natural senescence. Observations suggest that pecan cultivars with northern parentage are more sensitive to changes in day length than those of southern origin, thus northern types are less likely to experience damage from fall freezes.

The second stage of tree cold acclimation occurs when the temperature is low enough to kill foliage. Trees then enter a physiological state know as "rest" or more correctly "endodormancy". During this period, trees respond to warm temperatures by losing cold hardiness and accli-

mate in response to cold temperatures. However, while in endodormancy trees typically have a certain minimum cold hardiness level that is maintained even when exposed to prolonged warm temperatures. Endodormancy is satisfied by exposure to cool temperatures, normally between 32 and 50 °F. When trees receive inadequate chilling hours budbreak is irregular, growth is reduced and fruiting is impaired. Most pecan trees were in endodormancy when this weather event occurred, reducing the likelihood of damage.

When trees have accumulated adequate chilling hours the next physiological state is termed “ecodormancy”. This term indicates that the trees are physiologically ready to begin growth, but are dormant because environmental conditions are not favorable for growth. Trees in ecodormancy can rapidly lose cold hardiness when exposed to warm temperatures. Data are not available for pecan, but peaches in ecodormancy lose cold hardiness at about 2 °F/hour when exposed to warm temperature and only gain hardiness in cold temperature at about 2 °F/day. Previous exposure temperatures during ecodormancy are of paramount importance in cold hardiness of the tree.

As growth begins in the spring, buds and wood lack significant cold hardiness. Buds are less cold hardy than wood, but both can be damaged. The damage level is controlled by both the minimum exposure temperature and the duration of exposure. Generally, significant damage begins when the temperature reaches 28 °F.

Fall or winter cold damage to pecan has averaged about 1 in 9 years, although this is very cultivar and rootstock dependent. There are very cold hardy cultivars and native trees, and rootstocks that impart cold hardiness to the scion. Much of the damaging weather events can be avoided by selecting certain scion/rootstock combinations. Unfortunately, there are few cultivars with desirable production characteristics that also possess adequate cold hardiness. In addition, there are cultivars and native trees that tend to

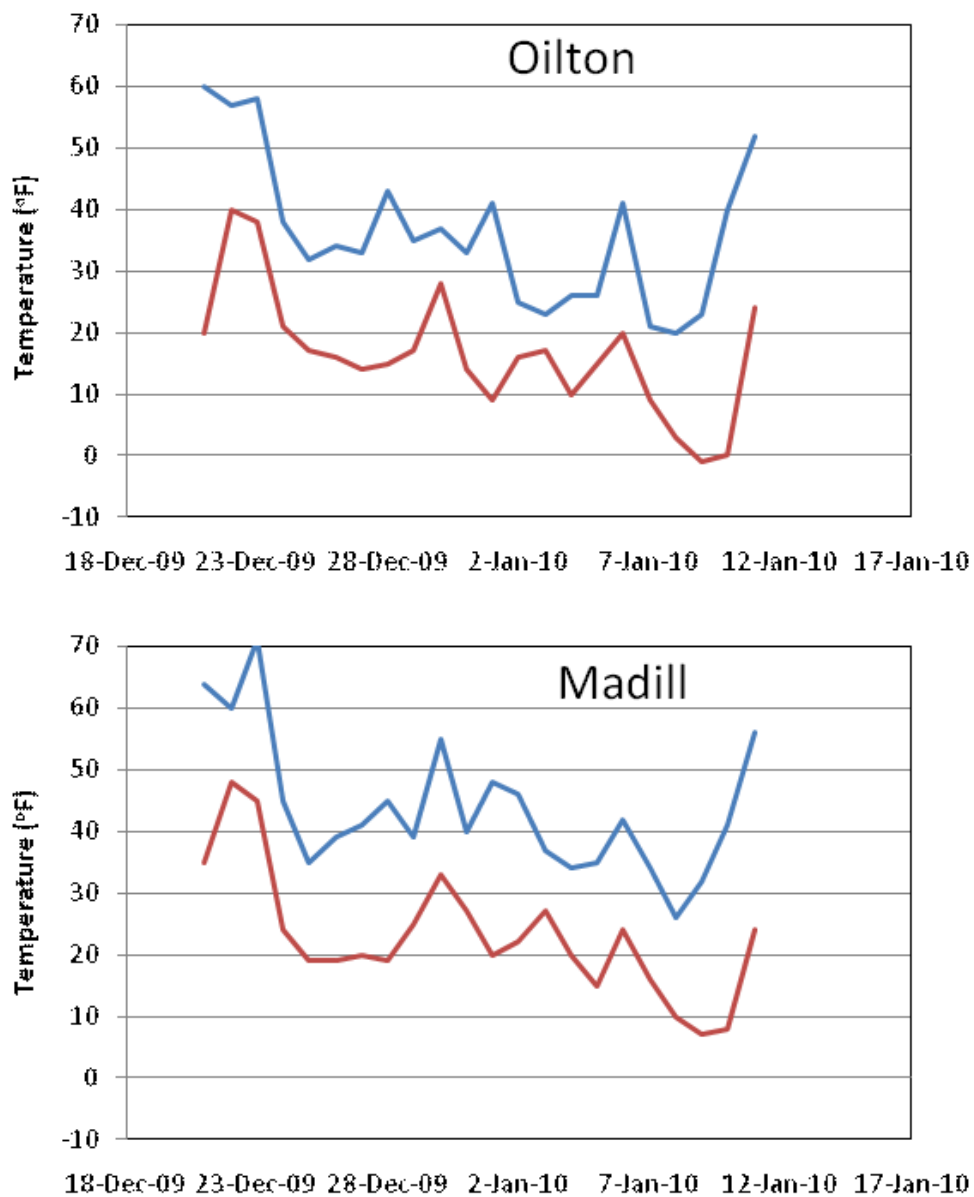


Fig. 1. Minimum and maximum daily temperatures from 21 December through 11 January at Mesonet stations located near Oilton and Madill.

avoid spring freeze damage with later budbreak than other trees. A pecan breeding program that emphasizes cold hardiness and frost avoidance along with other desirable traits could mitigate these environmental issues.

### **Pruning for Orchard Longevity** *Charles Rohla, Noble Foundation*

One of the most important and often forgotten tools in establishing a pecan orchard is the annual training and pruning of young pecan trees. Without training and pruning, trees will not develop a proper shape or form and will be more prone to damage by mother-nature. On the other hand, properly trained and pruned trees will yield higher without damage and have significantly longer life spans.

The objective of training and pruning is to develop a tree with a strong framework that will withstand diverse weather conditions and support the heavy weight of fruit production. Improperly trained trees generally have very upright branch angles, which are easily broken during wind, ice storms or under heavy fruit loads in turn significantly reducing the productivity of the tree and possibly reducing the life of the tree.

#### *Why training and pruning are required*

One thing to keep in mind is that grafted trees require more training and pruning as compared to seedlings. Seedlings and grafted trees should be handled quite differently. When dealing with seedlings, it is important to note that the tree has juvenile wood during the first several years following germination. Juvenile wood has only one growing point, the apex or terminal bud. This terminal bud will form the central leader that will result into what we think a tree should look like. There is little pruning needed to form the tree. There may be some training needed to form the proper scaffold branches and to reduce narrow crotch angles. However, the only required pruning on seedlings is typically the removal of lower branches to allow equipment access under the tree.

On the other hand, grafted trees require substantially more training due to the fact that there is more than one growing point. Grafting is the process of putting mature wood onto a juvenile rootstock. This mature wood needs to be trained to develop one single central trunk with strong, wide-angle branches. Untrained, grafted trees usually develop several trunks which have narrow branching angles and no central leader. The tree will have weak branches resulting from the weak trunk union caused by bark that becomes trapped between the trunk and branches as the tree grows. These narrow angles are weak and prone to split under high winds, ice or a heavy crop.

#### *Training vs. Pruning*

Training is essential for proper tree development. Training is directing a tree's growth into a desired shape and form. It is better to direct tree growth with early training than to correct it with pruning. Training includes both summer and dormant training. The goal of tree training is to direct the tree growth and minimize cutting. Unnecessary growth that uses tree energy will be eliminated through summer training therefore providing more energy for beneficial growth. For most purposes, summer training should be limited to removing the upright and vigorous current season's growth; only thinning cuts should be used. To minimize the potential for winter injury, summer training should not be done after the end of July.

Pruning is the process of removing a portion of the tree

to correct or maintain the tree's structure. Pruning is most often done during the winter. Pruning should begin as late as possible into the winter season to avoid winter injury. A good rule to follow is to prune the latest blooming trees first and the earliest blooming last. Another factor to consider is tree age, with the oldest trees being pruned first. Younger trees are more prone to winter injury from early pruning.

Trees respond very differently to dormant and summer training and pruning. Dormant training and pruning is an invigorating process. During the fall, energy is stored primarily in the trunk and root system to support the top portion of the tree. If a large portion of the tree is removed during the winter, while the tree is dormant, the tree's energy reserve is unchanged. Heavy dormant training and pruning also promotes excessive vegetative vigor, which uses much of the tree's energy, leaving little for fruit growth and development.

#### *Training and pruning the first year*

During the first growing season, a strong central leader should be encouraged and protected. As the buds start to grow, be sure to leave only one bud growing per node. If more than one starts to grow, pinch off the lower weaker buds. This will encourage the remaining bud to maximize its growth for the year. If a lateral bud starts to outgrow the central leader, pinch the tops off so that the central leader is the most dominant. Leave all lateral branches that are high enough to avoid herbicide contact. These small branches on the lower trunk are beneficial for food production and rapid root development. This is often referred to as a trashy trunk. Remove any nonpermanent branch before it reaches 1 inch in diameter.

#### *Second year training and pruning*

Encourage and protect the central leader. Cut back the central leader at the point where internodes are spaced apart. The nodes near the end of the terminal are closely spaced and if left to develop, a cluster of branches will grow in a crow's foot. Remove any branch that has a crotch angle less than 60 degrees. Start locating scaffold branches that will form the future trees.

#### *Scaffold branches*

Scaffold branches are the branches 6 feet or higher above the ground from which you will select permanent limbs. Keep in mind where choices can be made, it is always best to leave branches with wide crotch angles. Limbs with crotch angles greater than 60 degrees are much less likely to split out than limbs with narrow "V" crotch angles. The key is to check for trapped bark between the side limb and trunk. If bark is trapped, the limb will always have a weak attachment to the trunk and should be re-

moved. It is best if permanent scaffold branches are at least 2 feet apart. If the tree has too many branches, prune as needed to thin out crowded limbs.

*Succeeding years*

Managing the central leader is one of the most important aspects of dormant pruning. The leader should be headed at approximately 24 to 30 inches above the highest whorl of scaffolds to promote continued branching and scaffold whorl development. Unwanted growth, such as upright growing shoots and laterals with sharp branch angles not removed during summer pruning, should also be removed at this time. Unbranched lateral branches should be headed back by approximately 1/4 of their length to encourage side branches and to stiffen lateral branches.

Summer pruning in succeeding years should eliminate competing shoots where dormant heading cuts were made (on the central leader and laterals) as in the first year. Summer is also the optimal time to remove unwanted side shoots and excessive growth. All laterals should have a wide branch angle, and spreading of lateral branches is essential for many varieties.

Through early training, even varieties that are known to have poor tree structure can have sustainability. It may take a great amount of effort to train, but it is possible. Throughout the first half of the year do not be afraid of light training as this will only increase the longevity of your new orchard. It is always better to do light training during the summer and avoid major pruning during the winter.

If trees are properly trained and pruned, owners can expect a long productive life for their trees. Training can be time consuming, but is better for the tree in the long run and will maximize growth of young trees. Pruning is more invasive but is sometimes required for the optimal health of the tree. Both of these techniques should be used from the onset of your management program.

*Classified ads may be placed in the Newsletter for free by OPGA members. Send your ad to Mike Smith at mike.smith@okstate.edu and it will appear in the next newsletter and subsequent Newsletters until notification to remove the advertisement.*

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**Oklahoma Pecan Growers' Association**

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## Membership Application

We invite you to become a member of the Oklahoma Pecan Growers' Association. Membership includes the *OPGA Newsletter*, *Pecan South* and *Pecan Grower*. Make your checks payable to OPGA and mail to:

**Oklahoma Pecan Growers' Association**  
**Janice Landgraf, Treasurer**  
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**Madill, OK 73446**  
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