47th Annual

WESTERN PECAN GROWERS ASSOCIATION

Conference Proceedings

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The Annual Western Pecan Growers Association Conference

Pecan Food Fantasy

and

Pecan Trade and Equipment Show

sponsored jointly by

Western Pecan Growers Association

and

New Mexico State University

Cooperative Extension Service

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WPGA 2013 Educational Program

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Wealth Transfer and Business Succession Considerations for Pecan Farms in the Current Tax Climate

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Everyone has heard the phrase "Business Succession" before, but how many have thought about its true meaning? The phrase means more than business transfer; Business Succession means passing on the business with the opportunity for it to continue to succeed in the hands of the next business owner(s).

We at Farm Bureau Financial Services understand that Business Succession does not happen by accident or chance, it takes careful planning. To truly achieve Business Succession, a family needs to conquer all aspects of their future encompassing an estate plan, retirement plan, business plan, and assemble a team of professional advisors to establish, implement and integrate planning efforts.

Estate planning is a major piece of the puzzle and deserves serious thought. With the passage of new Estate Tax laws on January 1, 2013 (providing for a $5 million exemption per person and 40% tax), Estate Taxes may no longer be a pressing concern for many individuals. However, estate planning encompasses more than just tax planning. Designing a plan that accounts for special family circumstances and creates a rational plan for asset distribution is critical to achieving your goals and eliminating family conflict.

Planning for retirement is absolutely essential for business owners in today's climate as people are living longer and the cost of living continues to skyrocket. The vast majority of business owners can be categorized as: Asset Rich and Cash Poor. Typically, successful business owners reinvest profits back into their operations to continually update and improve them. This creates a dilemma; what if you and your spouse run out of liquid assets during retirement? What if you or your spouse needs nursing home care? If you are asset rich and cash poor, paying major bills is only achieved by selling business assets—this directly contrasts with the goal of Business Succession. If portions of the business must be sold to pay living expenses, how is the business to survive?

Many family's goals are to keep the business in the family for the next generation and hopefully many more to come. One common statistic is only 10% of family businesses survive to the third generation—that means 90% of family's don't plan properly! Planning for the future of the business involves a great deal of communication and soul searching—what future role will of family members be asked to take in the business? Is retirement in the picture—if so, is that financially feasible? Have you identified a business successor? Is the business successor

competent to take things over? One tool worth consideration is a Buy Sell Agreement. Buy Sell Agreements create certainty for an uncertain world. A properly drafted Buy Sell Agreement will specifically govern how the business will change hands in the future. For families and business owners alike this is essential; a Buy Sell Agreement is established ahead of time so when disaster strikes there is NO negotiation left to be done. If your Buy Sell Plan is successful, conflicts will be avoided and certainty will be created for the family and the business.

Establishing a team of experts to help create, implement, and integrate a plan is critical. We live in a complicated world; reaching out to trusted advisors you can depend upon helps to bring order to the madness. Your Farm Bureau agent can help you wade through it all and be the person that can help organize the process and integrate your plans and your team of advisors.

Starting to plan is oftentimes the hardest part. However, not planning invites disaster. The longer your family goes without planning the less options you will have, the more complicated your situation can become, your options may become more expensive and who knows, disaster could strike in the meantime. Contact your Farm Bureau Agent *today* to start the process.

Smart-Phone Applications for Pecan Production

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Since the middle of the previous decade, mobile phones have become more like standard laptop and desktop computers, being able to access the Internet and run applications written by programmers around the world. The operating systems (OS) that these smart-phones use have been developed by companies such Apple, Google, Microsoft, and Blackberry, with Apple's and Google's implementation being the most popular. The smart-phone OS developed by Apple is known as iOS and powers the popular iPhone and iPad devices. Google created the Android OS, which powers smart-phones and tablets from several different manufacturers. Because of the prevalence of the iOS and Android smart-phone platforms, an extensive library of applications is available for each platform to be purchased or downloaded for free. Included in these libraries are applications that can be used in the agricultural field. While not specifically developed for pecan production, most of these applications are generic enough to be useful to pecan growers and the applications can be grouped into the following three categories: informative, utilities, and weather.

Informative applications can provide the smart-phone user access to reference material stored on the phone or on the Internet. One example of such an application is the SoilWeb application which was developed by the UC Davis Soil Resource Laboratory. This application is free to download and is compatible with the iOS and Android platforms. Using the GPS hardware in modern phones, this application determines the user's current location and retrieves the soil information for that location. Agrian Mobile is another example. Developed by Agrian Inc., this application allows the user to retrieve product labels and material data safety sheets from the Agrian Inc. database. This application is iPhone only and may be downloaded for free. The developer also has paid versions of this application that provides the user with much more functionality over the free version. Another example of an informative application is My Plant's Health, developed by Josh Sherman, a graduate student at NMSU. This application is compatible with the Android OS and is currently only available by contacting the developer personally. Using a series of drop down lists, this application helps the user identify a plant's nutrient deficiency.

Utility applications help the user by providing functionality to perform calculations in the field and store field data for later retrieval. DuPont developed an iOS only application, called TankMix, that allows the user to easily calculate the amount of product needed to treat a specific field area, the amount of product needed to apply to a specific tank size, and the amount of water needed to treat a specific field area or the amount of product needed to get the desired volume to

volume ratio. The application is available to be downloaded for free. Similar to the TankMix application is an application called Mix Tank. Developed by Precision Laboratories Inc., this application is free to download for the iOS and Android platforms. Mix Tank provides product mixing recommendations for sprays. Further, using the built-in GPS hardware on modern smart-phones, this application is able to log spray times and locations for future reference. AgDroid is an example of a paid utility application and is only available for the Android platform. Developed by Farmscan AG, this application calculates field coverage of sprays and tracks applied products over multiple field locations. AgDroid currently costs $10.71 and it is available for purchase from the Google Play Store.

There are several examples of weather applications available for the iOS and Android platforms. Weather Underground, developed by Weather Underground Inc., provides access to personal weather station data for a given location. The application also provides the smart-phone user with weather alerts. Similarly, WeatherLink by Davis Instruments Inc. provides the user with personal weather station data from the Davis WeatherLink network. Both the Weather Underground application and the WeatherLink application are available for free. Dr. Blair Stringam, a professor at NMSU, is currently developing an application that provides remotely sensed weather data for the smart-phone user's location and calculates the evapotranspiration from the data. Still in development, Dr. Stringam plans to support pecans in this application. Finally, LoggerLink, by Campbell Scientific Inc., also provides a smart-phone user with near real-time weather data. However, this application requires the user own and operate an Internet connected Campbell Scientific weather station, which can cost upwards of $5000. Further, the application costs $30.

The smart-phone applications listed here are only a small number of the total agricultural based applications available. Most may be generic enough to be useful to the pecan growers, but by working to create a demand, the pecan growers could see future applications specifically tailored to pecan production.

ilovepecans Goes Social

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That National Pecan Sheller's Association (NPSA) is a non-profit trade association dedicated to promoting the nutritional benefits and uses of pecans to food professionals, dietitians, nutritionists and consumers. In 1998, we launched the Marketing, Promotion, and Research Program (MPRP) to help market pecans to the trade and consumer industry. Since this program launched we have had over $2.8 million invested in MPRP. The goal of this presentation is to highlight some program activities during the 2012/2013 year that were conducted through the generation donations to our MPRP Program.

Pecan Research at Tufts University
Since 1998, MPRP has served as the cornerstone for nutritional research on pecans. Our past clinical trials on pecans have focused on young healthy subjects and their overall health improvement when adding pecans to their diet.

This year, NPSA has initiated a new pecan research study with Tufts University. This two-year study will be looking at the health benefits pecan consumption can afford adults who are over the age of 50 who are healthy but are at an increased risk of developing diabetes or heart disease. Participants will participate in a cross-over feeding trial with half receiving a controlled diet and the other half receiving a diet that has been enriched with pecans. This research is expected to reinforce the current health claim that a handful of pecans a day can keep adults healthy and improve the risk of heart disease and diabetes.

New Digital Initiatives
As part of a new marketing strategy this year, NPSA has launched Facebook, Twitter, and Pinterest pages to reach to the ever-growing online consumer market. We are using these platforms as a low-cost and efficient way of reaching new consumer audiences, including younger demographics and health conscious males, to educate them about the nutritional benefits of pecans and how to incorporate them into a daily diet. It's been only six months and we are already at 24,000 Facebook fans.

Perfect Performance
This year, NPSA launched *Perfect Performance,* a new publication designed to highlight the nutritional and commercial uses of pecans. Created with the domestic and global markets in mind, *Perfect Performance* serves as a great marketing tool for pecan shellers and growers, providing an antioxidant chart, highlighted commercial uses of pecans, nutritional information, along with a standard pecan size/color chart. The publication is available for purchase and can be ordered through NPSA headquarters.

Trends in the South African Pecan Industry

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South Africa is the world's third largest pecan producer after the United States and Mexico. Pecans have a long history in South Africa, having been brought by settlers in the late 19th and early 20th centuries. Early production was centered in the high rainfall (32" or more per year), tropical eastern regions of the country. Production there is hampered by insect and disease pressures, much as in the southeastern United States. In the past 15 years, pecan planting has greatly accelerated, and is now focused in the desert regions of north central and northwest South Africa. A brief visit and tour of pecan orchards in this region in February 2013 resulted in this synopsis of the South African pecan industry.

South African and United States pecan producers and scientists have had a long relationship. In the 1970's and 1980's Dr. Nigel Wolstenolm of the University of KwaZulu-Natal spent time at the University of Georgia and Texas A&M University. He became a world renowned expert on pecans and co-authored the Texas Pecan Growers Handbook. In 1991, the South African Pecan Producers Association (SAPPA) was established, and in 1997 a group of South African pecan producers visited orchards in the United States. In 2002, Esteban Herrera of New Mexico State University and Dr. Bruce Wood of the USDA Agricultural Research Service visited South African pecan areas. The South Africans visited Stahmann Farms in Australia in 2006, and the southwest United States and Mexico in 2011. They are keenly interested in learning about pecan production around the world.

South Africa is an excellent location for pecan production. Their pecan producing areas are situated along the 30th parallel, as are our major pecan producing areas. Therefore, day length and solar angle are similar to the native pecan range. In the irrigated desert regions where pecans are now being planted, the rainfall ranges from approximately 8" to 18" per year. Temperatures are similar to southern Arizona.

Irrigation water is provided by rivers. We visited two locations. Upington is situated along the Orange River, and the Vaalharts area is near the confluence of the Harts and the Vaal Rivers. The Vaalharts irrigation project, built in 1933 to 1939, irrigates approximately 80,000 acres. It has traditionally supported field crops such as peanuts, alfalfa, corn, and wheat. Growers in the Vaalharts region are responsible for most of the recent pecan plantings, and approximately 50% of the countries pecan acreage is in this area, most on buried drip irrigation. In 2012, South Africa added nearly 5,500 acres of pecan trees. Planting over the past five years has averaged approximately 3,000 acres per year. The total acreage is thought to be about 30,000 acres, 10,000 of which are in production at this time. 2012 nationwide yield was approximately 9,000 tons and projections by SAPPA suggest that by 2016 that number will more than double.

Most of the trees in South Africa are Wichita or Western Schley, and most (about 75%) of the crop is sold in-shell and exported. Domestic consumption is not expected to grow substantially.

South Africa has both pecan producing advantages and disadvantages. They have a lot of land that could potentially support pecan production. In the Vaalharts area alone, there are at least 50,000 acres that could be used. There are no aphids in this part of the country, and no black aphids in the entire country. Additionally, their harvest season runs from May to August, so they are not in direct competition with northern producers.

On the other hand, South Africa has no cold storage at this point, so nuts must be marketed as they are produced. Also, many of the new plantings are in corners of center pivots as a secondary crop. These small, odd-shaped blocks will be difficult to manage. There is a striking lack of uniformity in many orchards, perhaps because of nursery production issues. More importantly, many of the mature orchards are heavily shaded, hedging is largely an unused practice, and hedging equipment is very limited. As a result, alternate bearing is a serious problem. Labor costs are increasing, and there is a clear need for more mechanization. South Africa is also struggling to produce the large nuts now in demand on the international market. Part of the reason for this may be the Ukulinga root stock widely used in South African nurseries.

Lastly, land redistribution is a source of uncertainty for investors. Following apartheid, 87% of commercial farmland was owned by whites who made up 13% of the population (now it is less than 10%). Land redistribution, launched in 1994, planned to redistribute 30% of white-owned farmland to poor blacks by 2014. So far, 8% (4,813 farms comprising 10 million acres) has been transferred. There is discussion about re-opening restitution claims by people who missed the previous December 31, 1998 deadline. Fifty to 70% of farms that were redistributed have failed, largely due to lack of money and skills. One result is that since 2007, South Africa has been a net importer of food. Although South Africa has compensated transferred land at market price, the uncertainty of redistribution has hampered long-term investment in agricultural development.

South Africa will remain the third largest pecan producer in the world, and will make up a growing segment of production. They have the potential to have roughly 100,000 acres of pecans, but they will be limited by water limitations, lack of equipment, shortages of skilled labor, rising electricity costs, poor drainage and salinization in some areas, the uncertainty of land redistribution, alternate bearing, small nut size, and other challenges. However, it is clear that the South African pecan producers are progressive and will learn the intricacies of pecan production and overcome these challenges rapidly.

Meeting Your Orchard's Season-Long Nitrogen Requirement

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When considering nitrogen nutrition there are four important over-arching questions to consider in order to maximize your pecan orchard's profitability and sustainability:

1) What is the right source of nitrogen to apply?

2) What is the right rate of nitrogen application?

3) What is the right time for nitrogen fertilizer application?

4) What is the right place for nitrogen fertilizer application?

Right Source.

Plant roots take up nitrogen mainly in two forms, as nitrate (NO_3^-) or ammonium (NH_4^+). Nitrate is the dominant form in soils, even when primarily ammonium-based fertilizers are used, because ammonium is converted rapidly by microbes to nitrate. Ammonium fertilizers can acidify non-buffered soils, but this is not really a major concern in most southwestern pecan orchards. Nitrate's negative charge increases the risk for leaching losses compared with ammonium. Ammonium is preferred over nitrate fertilizers in southwestern pecan orchards, because nitrate, more than ammonium, can stimulate excessive vegetative growth at the expense of nut production.

Nitrogen may also be supplied from some non-fertilizer sources. If managed correctly, legume cover crops in orchards can potentially supply 50-100 lb of nitrogen per acre annually. Manures and composts are often used like fertilizers, but they often have relatively low nitrogen content (<2%) and must be applied at very high rates to supply significant amounts of nitrogen. With manures and composts, it is also important to consider two other things: usually only part (<20%) is available for plant uptake in the first year (as opposed to most synthetic fertilizers where 100% of the N is plant available as soon as it is applied) and some manures/composts can contain injurious levels of salts for pecan orchards. It is wise to have laboratory analyses for manures and composts prior to orchard application to know the total nitrogen that it contains, the carbon to nitrogen ratio, and the salt content.

Right Rate.

The right rate of nitrogen application depends primarily on tree size/age and on crop load. The 'gold standard' for pecan tree nitrogen nutrition is the leaf tissue nitrogen concentration of July-sampled leaves—maintain leaf nitrogen within the range of 2.5-3.0%. Young non-bearing trees

may be injured by excessive nitrogen application rates by direct toxicity or by an increased risk of freeze injury with the first autumn freeze. For young trees a good rule of thumb is ¼ lb. actual nitrogen per year per inch trunk diameter—but it is important to use leaf analyses to adjust this rate up or down accordingly. For bearing trees, increase the application rate with increasing expected yields. An oft-recited rule of thumb in the industry is "apply 100 lbs. nitrogen for every 1000 lbs. of expected crop (in-shell)". That rule might be a good starting point but represents over-application of nitrogen in many—or even most—orchards. Again, use leaf analyses to refine this. When considering nitrogen application rates, remember that some irrigation water contains considerable amounts of nitrate nitrogen. Be sure to analyze your well water for nitrate so that you can include nitrogen from irrigation water in your total nitrogen rate calculations.

Right Time.

Efficiency of tree nitrogen fertilizer uptake is increased if applications are made multiple times in the season in smaller amounts—and timed to the periods of highest nitrogen demand. In bearing pecan trees there are two periods of high nitrogen demand: early in the season when the leaves and shoots are growing rapidly (April through June) and during kernel fill (September-October for 'Western' and 'Wichita'; earlier for 'Pawnee'). In alternate bearing orchards apply all of the total planned nitrogen for the year during the early leaf/shoot growth stage in 'Off' seasons. In 'On' years apply 4/6 or 5/6 of the total planned nitrogen for the year during the leaf/shoot growth stage. Then use your July leaf analyses and crop load assessment, to decide if you need to make one or two more nitrogen applications during kernel fill. In immature, non-bearing trees be sure to make all nitrogen applications before July—or even earlier if your orchards are in a colder, shorter-season growing area. Late nitrogen applications in young orchards can increase the risk for fall freeze injury.

Right Place.

With young trees it is especially important to place the nitrogen within the reach of the smaller tree root system—but not right up against the trunk where it can damage tender bark tissues. Banding nitrogen fertilizers near the tree row may be preferable to broadcast application in mature orchards where a vegetation-free herbicide strip is maintained in the tree row. This prevents competition for nitrogen by orchard floor vegetation. This is also valuable in orchards where legume cover crops are maintained, because supplemental nitrogen fertilizers can cause legumes to decrease their nitrogen fixation rates. In orchards that have pressurized irrigation systems that wet only part of the orchard floor, it is critical to place the nitrogen fertilizers within the wetted areas. The simplest and most effective way to ensure that the fertilizers are placed only within wetted areas of the orchard floor and deliver the nitrogen right to feeder roots is to inject the fertilizer into the pressurized irrigation system (fertigation). Fertigation has the additional benefit of supplying nitrogen more uniformly across orchard blocks than as a broadcast application.

Masters Research: Manganese Levels for Maximum Photosynthesis

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An element or mineral is essential to pecan (*Carya illinoinensis*) if it complies with three criteria: One, the tree cannot complete its life cycle when the element is deficient. Two, the element cannot be replaced by any other element. Three, the element is directly involved in structural or metabolic processes in the pecan tree. There are 14 essential minerals for pecan consisting of macronutrients and micronutrients. Within the leaf tissue, macronutrients are those minerals needed in higher concentrations and micronutrients are needed in lower concentrations. The micronutrients (zinc, iron, manganese, copper, boron, molybdenum, chlorine, and nickel) are just as important as the macronutrients (nitrogen, potassium, phosphorous, calcium, magnesium, and sulfur). Soils in the southwest are typically alkaline and calcareous thus making phosphorus and most micronutrients, including manganese, less available for root uptake. Manganese (Mn) is essential for the photosynthesis process, specifically in the oxidation side of the photosystem II complex. Mn also acts as a coenzyme for biosynthesis of chlorophyll. The NMSU Cooperative Extension Service recommendations for New Mexico (NM) pecans are 100-300 ppm Mn in July sampled leaflet tissue. A published survey of NM pecan orchards showed, on average, only 85 ppm Mn in leaf tissue, but the level of Mn at which photosynthesis is optimum is not yet known. Our objective was to characterize Mn impacts on photosynthesis over a broad range of leaf Mn concentrations.

In 2011 and 2012, an experiment was conducted on 24 second leaf 'Pawnee' pecan trees in Las Cruces, NM. There were four treatments in which Mn (as an amino acid chelate) was applied foliarly with three applications in the first season and five in the second season at four different concentrations: 3% (High), 1.5% (Medium), 0.75% (Low), and 0% (Control) Mn. Gas exchange was measured using a portable photosynthesis system and correlated to leaf Mn tissue concentrations. Average leaf Mn concentration in 2011 was 38, 52, 149, and 302 ppm in the Control, Low, Medium, and High treatments, respectively. Concentrations in 2012 were 53, 84, 147, and 329 ppm in the Control, Low, Medium, and High, respectively. All other nutrients were within normal ranges. Leaf Mn concentrations were not significantly different across treatments on May 2012 (prior to 2012 Mn applications), indicating no carryover of Mn from 2011. Analyzed across dates the Medium Mn treatment had significantly higher photosynthesis and stomatal conductance ($\alpha = 0.05$) than the other treatments. Our data confirm a relationship between photosynthesis in pecan and Mn nutrition. Furthermore, our results suggest that photosynthesis in NM pecan orchards is limited by Mn.

Recognizing and Diagnosing Herbicide Injury Symptoms

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Diagnosing herbicide injury depends on being able to identify patterns of crop injury in the field as well as patterns and characteristics of herbicide injury symptoms in individual plants. An injury pattern that is confined to or most pronounced on one edge of a field and gradually diminishes across the field is often indicative of the physical movement or drift of spray droplets from an herbicide application. The pattern of drift and diminishing injury will match the prevailing wind at the time of the application. The drift pattern on the edge of and into the field can be a fairly uniform gradient or it may be variable exhibiting lobes or arcs of greater injury if the wind was variable or gusting at the time of herbicide application. In general, herbicide drift injury from ground applications may extend into a field up to100 feet depending on wind speed and direction but aerial applications may cause injury symptoms for hundreds of feet. If a temperature inversion existed at the time of the herbicide application, injury to surrounding vegetation can occur at long distances from the field where the herbicide was applied. Look for injury symptoms on surrounding vegetation and weeds for additional clues.

Irregular or patchy, discontinuous distributions of crop injury in a field can be caused by herbicides that volatilize (i.e., conversion from a solid state on leaf surface to a gas) and move independent of spray droplets. This most commonly happens with phenoxy-type growth regulator herbicides that cause unique injury symptoms that include twisting shoot tips, twisting, drooping leaves and abnormal leaf and stem growth. This type of herbicide off-target movement is often unrelated to the direction of wind movement at the time of herbicide application and the distances traveled can be miles especially if a temperature inversion occurs in the atmosphere. Other patchy or streaky herbicide injury patterns that may occur are those that are correlated with changes in soil texture or other soil properties and are caused by preemergence herbicides (see below for further discussion).

Many herbicide injury patterns that occur in fields are patterns related the width of the spray swath (i.e., length of the spray boom) or patterns with a clear, abrupt demarcation between injured and uninjured crop plants. Mechanical sprayer problems such as faulty tank agitation can result in a pattern where the injury is most severe where spraying started and diminishes and disappears as the sprayer moves through the field only to reappear at the point where spraying begins again after mixing a new batch of chemicals. Incomplete or lack of tank cleaning between spray jobs can also cause similar looking injury patterns (without the repeating strips with subsequent tank mixes). Using the wrong herbicide or using too high an herbicide rate may result in a portion of a field sprayed with that tank mixture showing crop injury that does not appear

with subsequent tank loads of herbicide mixtures. Sometimes an abrupt demarcation of injury symptoms may be correlated with a change in crop variety and differing herbicide sensitivity.

The expression of herbicide injury symptoms on individual crop plants is related to the way an herbicide moves in plants, the way it was applied and the herbicide's mechanism of action. The commonly used herbicide, glyphosate (Roundup and many other trade names), moves or translocates with sugars produced in mature leaves (i.e., "sources") to growing points and young, immature, expanding tissues such as shoot tips, flowers, seeds, and small, new leaves (i.e., "sinks). Thus, injury symptoms such as chlorosis will appear on new growth first and only later in mature tissues with herbicides like glyphosate, halosulfuron (i.e., Sandea), sethoxydim (Poast) and fluazifop-p-butyl (Fusilade DX) that exhibit this "source" to "sink" pattern of movement. If glyphosate is applied in the fall and is absorbed by pecan leaves, it can move with sugars to storage tissues ("sinks") and may not cause symptoms in the plant that can be distinguished from normal leaf senescence in the fall. However, when the food reserves in the storage tissue are mobilized in the spring or other times (i.e., become sources), the glyphosate will move with sugars to shoot tips, buds and other sink tissues and cause growth abnormalities such as narrow "strapped" leaves with very short internodes.

Most preemergence herbicides used in pecans are applied to the soil and incorporated with irrigation water in western pecan orchards although trifluralin needs to be mechanically incorporated due to its limited mobility in soil. The preemergence herbicides flumioxazin (Chateau), oryzalin (Surflan), pendimethalin (Prowl) and oxyfluorfen (GoalTender) have very limited soil mobility and rarely if ever move with water flow up the tree from the roots to mature transpiring leaves. Other preemergence herbicides that can be used in pecans such as diuron (e.g., Karmex), norflurazon (e.g., Solicam) and indaziflam (e.g., Alion) have moderate mobility in the soil, are absorbed by roots and can move with water in the vascular system (i.e., xylem) from roots to transpiring leaves. If concentrations of these herbicides are too high in leaves, symptoms will result and in severe cases limbs and whole trees can be killed. Indaziflam also causes characteristic stem lesions that leak fluid and appear as wet patches, often in an irregular column up the trunk and stems. The injury symptoms caused by norflurazon (chlorosis and bleaching to the extent that the veins are white) and diruon (veinal chlorosis) reflect the concentration of herbicide in the leaf. The rate of diruon, norflurazon and indaziflam applied must be matched to soil texture to avoid tree injury. An interesting characteristic of xylem mobile herbicides is that the largest, fully expanded leaves which are transpiring the most water are often the first leaves to show injury because they accumulate phytotoxic levels of the herbicide before immature tissues which are not using as much water.

Several postemergence herbicides used in pecans are "contact" herbicides that kill green tissue where spray droplets land on the plant surface but don't translocate or move to other parts of the plant. That is why good coverage (i.e., lots of droplets and uniform distribution on leaf surfaces) and spraying small weeds are important for the performance of these herbicides. Examples include carfentrazone (Aim), glufosinate (Rely), paraquat (Gramoxone), and pyraflufen-ethyl

(Venue). Also included in this group of herbicides are the preemergence herbicides diuron, flumioxazin and oxyfluorfen when they are mixed with surfactants and sprayed postemergence on weeds. Injury symptoms caused by these herbicides on pecan leaves are due to the physical drift of spray droplets that results in small necrotic spots or lesions. While this injury is rarely significant, it does indicate the importance of managing nozzles and spray parameters to reduce spray droplet drift.

Precision Canopy and Water management of Pecans

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The main purpose of this presentation was to inform the audience of progress made in sensor-based management of tree canopy and irrigation water for Pecan production in the Semi-arid conditions of Arizona and New Mexico. Funding for this project comes from a USDA-Specialty Crops Research Initiative Grant (2010-01213) that was formulated to incorporate advances in electronics into the decision making process in canopy and irrigation management of a variety of tree crops including: Walnuts, Almonds, Hazelnut, Apples, Cherries, and Pecans. Five Land-Grant Institutions take part in this project, these include the following universities: Washington State, Oregon State, California-Davis, Arizona and New Mexico State.

The presentation covered vehicle and platform-design for sensor deployment inside the orchard. The vehicle chosen was a Kubota RTV-900 with diesel engine, 4WD with ports for hydraulic and electric power. This vehicle carried in the front a structure supporting 25ft of continuous PAR (Photosynthetically-Active Radiation) light sensors, along with a variety of sensors to monitor ambient conditions such as temperature, relative humidity, wind speed and direction, and additional solar radiation pyranometers and quantum sensors. During field deployment of this system, all sensor data was geo-referenced with the addition of a GPS with advanced algorithm that allowed satellite communication under conditions of canopy obstruction. Data was generated real time and stored in specialized rugged data loggers for post-processing and analysis. This vehicle has been enabled with a GPS-based navigation system for automatic steering.

This system has been used in orchards in Arizona and New Mexico to assess light conditions in the orchard created by different combinations of pruning frequency and intensity. These on-going experiments are exploring relationships between light interception and tree productivity. Preliminary results indicate that the current functionality in this system provides an excellent tool to explore the temporal and spatial dimensions of light conditions in pecan orchards, as well as the thermal and spectral response of the tree canopy to water stress. Canopy and irrigation management in Pecan orchards will be improved with an increased understanding of the dynamics of light penetration and water stress detection.

Mechanical Crop Thinning in the West

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Pecan crop load management can be done in several ways. Hedging reduces crop in the short-term on the trees that are hedged. Since hedging is done routinely in the West, my discussion will focus more on crop load management by mechanical crop thinning. In this method, pioneered by Dr. Mike Smith and others in Oklahoma and Kansas, the excessive crop is controlled by shaking the nuts out of the trees with the same shaker used for shaking at harvest time. The nuts are removed between the time of half ovule expansion and full ovule expansion, which coincides with the beginning of shell hardening. The dates will vary by cultivar and season, as well as by location. In the southeast on standard cultivars, the window is from late July through the second week of August.

The first question I suppose the grower might ask is "Why would I purposely shake nuts out of the tree three months before harvest?"

My answer is "Because you make more money when you do." This has been demonstrated numerous times by researchers in the Southeast and Midwest, including Mike Smith in Oklahoma, Bill Reid in Kansas, Bill Goff and Monte Nesbitt in Alabama, Lenny Wells in Georgia, and Charlie Graham in Louisiana. Research has shown benefits from improved quality, reduction of sticktights, lessening of limb breakage and cold damage, and return crop improvement in the off year. The two-year benefit can substantial - one study Lenny Wells and others in Georgia did on Cape Fear resulted in a two-year advantage of $104 per tree for those that were mechanically crop thinned compared to those that weren't.

In the West, the procedure is not commonly used. Among the reasons growers might suggest for not crop thinning would be that the hedging strategy can temper crop load by itself, and Western growers with more sunlight, deeper soils, and absence of most diseases, can sustain higher yields and need them for maximum profitability. I would call attention, in response, to a presentation done a few years ago by Brian Blain from California, on hedged trees of Wichita, Cheyenne, and Western Schley.

Blaine shook some overloaded trees, removing about half of the nuts. Originally, the crop ***potential***, he concluded, was 225 pounds per tree or 6000 pounds per acre. On the trees he left with no crop removed, the actual potential crop of 6000 pounds actually materialized into a crop of 1600 pounds of low-quality nuts. The rest of the nuts were worthless pops and blowouts.

If he shook out half of the nuts, the actual crop came in at 2500 pounds of well-filled nuts, easily surpassing the 1600 pounds of low-quality produced on the unthinned trees. His overall strategy, which included crop thinning as well as hedging, aggressive aphid control with systemic insecticides, and every other row flood irrigation, improved orchard performance dramatically. Before, he had an on-year production of 1600 pounds at 48% kernel, followed by an off-year crop of 700 pounds at 48% kernel. After implementation of the program, on-year crop was reported at 2500 pounds at 61% kernel, followed by an off-year crop of 2200 pounds at 61% kernel.

Perhaps, in the West, crop thinning should be a secondary, "fine tuning", strategy to complement hedging. Unlike hedging, crop thinning has the advantage of being a judgment call on an individual tree basis. So, you use crop thinning only on those trees that need it, passing by the others. We sometimes go to the trouble of putting a red flag on the heavily overloaded trees, and a yellow flag on the moderately overloaded trees, with no flag on trees not overloaded. Then the shaker operator shakes the red trees aggressively, the yellow trees moderately, and passes by the others. Over time, an experienced operator doesn't need the flags and can look at the tree and tell how much the shake.

Bear in mind, that my observations over many years, and research by Bruce Wood and Mike Smith, have clearly demonstrated a great deal of variation from tree to tree in the same orchard with the same cultivar. The extreme example in Wood's research showed the best Stuart tree, among 21 trees studied, with a six-year average of 328 pounds, compared to an average of only 26 pounds for the worst tree. Some of this variation is attributable to rootstock, which can vary greatly from one tree the next even when the same seed source was used to grow the trees.

Growers often think that trees are very similar, but when we've kept up with individual tree yields, this hasn't been the case. In an on-year, the majority of trees may be on, but not all are. Among those that are on some are much more heavily overloaded than others. Discerning which is which is very important, and addressing the needs on the tree to tree basis can have a major impact on your orchard performance.

I'll call attention to a study conducted by Jim Walworth at the FICA orchard in Arizona, and reported on at the Western Pecan Growers Convention in 2012. This excellent report kept up with individual row yields in the year following hedging and the subsequent three years. On Western Schley, a row that was hedged and topped produced approximately 1000 pounds per acre in the year following hedging. In the second year, yield increased to about 2000 pounds per acre. In the third year following hedging, yield further increased to 3000 pounds per acre. In the fourth year after hedging, it was about 3600 pounds per acre per acre, and would likely have approached the 4000 pounds if quality had not declined because of the overcropping.

Perhaps a grower could use the mechanical crop thinning to complement hedging in the following manner.

The year after hedging, that row with lowered crop would likely not need crop thinning. Similarly, two years after hedging, crop is still likely to be low enough, at 2000 pounds per acre approximately, where crop thinning would be needed. By the third year after hedging a row, however, many trees would be overloaded to the point of benefiting from crop thinning, so an attempt to be made to identify the most heavily overloaded, and to remove some of the nuts by crop thinning. By the fourth year, most of the trees are overloaded, and a more aggressive crop thinning would be made on those rows that were so overloaded.

One problem with mechanical crop thinning is the possibility of trunk damage. The procedure is done during the growing season when active growth can be occurring. A good shaker, and shaker operator, is necessary. Gauging the trees condition at time of shaking is important. If trees had been recently irrigated, this could initiate a growth spurt making the bark slip too freely for shaking at that particular time. Rather, waiting until near the end of a cycle of irrigation, when the soil is dryer would likely result in less part slippage and tree damage.

Pecan tree shakers have little traction, and it may be necessary to revamp the flood irrigating process to flood every other middle so that the shaker can travel on the dry ground to accomplish the procedure. Different shakers may damage more than others. An Orchard Rite shaker with the "wethead" feature which automatically lubricates between the flaps and shaker pads may be a benefit. Without this feature, lubrication with liquid silicone or grease is necessary to reduce part slippage.

Details of the crop thinning procedure are well-defined and available, so I won't repeat them here. A good general reference is available from the Oklahoma State University website: http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-1051/ .

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Kernel Necrosis

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Pecan kernel necrosis is a malady characterized by development of a dark necrotic area at the basal end of the kernel. This problem is particularly severe on 'Pawnee' at some locations during certain years. Currently, the cause of kernel necrosis is not known. Initially, this problem appeared confined to certain cultivars in a north Texas orchard in the Red River Basin and 'Oklahoma' in a central Oklahoma orchard adjacent to the Deep Fork River. Following El Paso, Texas producer reports of an unknown problem on 'Pawnee', mature nuts from orchards near El Paso, north Texas, and southern, central and northeastern Oklahoma were evaluated for kernel necrosis. Kernel necrosis was abundant on 'Pawnee' nuts from El Paso and southern Oklahoma, moderate at the north Texas site, and at low levels in one northeastern Oklahoma orchard. None was found in two 'Pawnee' orchards, one in central Oklahoma and the other in northeastern Oklahoma. In another study, yield was monitored on hedge-pruned 'Pawnee' pecan trees over a 5-year period to determine the relationship with kernel necrosis. The incidence of kernel necrosis was greater when yield was less. A third study sampled nuts from the lower and upper one-third of canopies from randomly selected trees varying in trunk size. Kernel necrosis frequency was similar in the upper canopy among different trunk sizes, but the incidence in the lower tree canopy decreased as trunk size increased.

Soil Health

Rudy Garcia
Agronomist
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New Mexico USDA-NRCS is implementing our new National Initiative on Soil Health. Thus, we have started several field demonstrations to learn what combination of conservation practices work best to achieve soil health. Soil health can be assessed by numerous basic field tests such as: slake test (to measure water-stable aggregates); Rain simulator/infiltration test; Solvita CO2 respiration test (to assess microbial activity and potential mineralizable N); and other field test such as EC, pH, number of earthworms, etc... Our soil health demo on a pecan orchard in the Mesilla Valley consists of the following conservation practices that have been implemented: 1) laser leveled fields, 2) installation of a micro-sprinkler irrigation system, 3) application of compost, 4) no-till (mowing of Bermuda grass), 5) comprehensive nutrient management (irrigation water, soil and tissue tests), 6) Integrated Pest Management, etc. At this early stage of the demo, the results of improved soil health are obvious: lower soil temperature, improved aggregate stability, presence of earthworms, major reduction of wind erosion and soil crusting, etc. Much is being learned and this is a work-in-progress. The producer is wanting to learn more about soil health and the conservation practices that will get you there.

TEXAS RESULTS: IMIDACLOPRID RESISTANCE IN BLACKMARGIEND PECAN APHIDS

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ABSTRACT:

The conclusion of the 2012 growing season ended a two year cooperative study by Texas A&M AgriLife Extension and the USDA-ARS Southern Region Agricultural Center, College Station, Texas in looking at imidacloprid resistance in blackmargined pecan aphids, *Monellia caryella* (Fitch). Imidacloprid is classified as a Group 4A insecticide by the Insecticide Resistance Action Committee (IRAC) www.irac-online.org and is one of the most common insecticide active ingredients applied to pecan for management of pecan aphids.

There have been some significant control problems of blackmargined aphids with imidacloprid based products over the last several years in New Mexico and the southeastern pecan producing states which initiated the survey to determine if or what levels of resistance may exist in Texas. During 2011 and 2012 a total of 46 separate laboratory tests of BMA from orchards across 11 Texas counties were made. All testing was conducted in a laboratory setting by placing BMA alates (winged form) on treated foliage and recoding mortality and first instar production at 24, 48 and 72 hours. Results after 72 hours of continuous exposure to imidacloprid treated foliage ranged from 85 percent survival and 165 first instars produced to 0 percent survival with no first instars. This range of control showed that there are areas of resistance in Texas. However, when difficult to control populations were retested against products with a different mode of action (IRAC Groups 4C, sulfoxaflor; 9B, pymetrozine and 9C, flonicamid) effective control was achieved.

Based on two years of test results, recommendations for management actions to reduce or prevent resistance to imidacloprid in BMA populations include:

- Rotate IRAC group numbered products, not name brands
- Do not use more than two consecutive applications of the same IRAC group numbered product
- Where possible treat only problem varieties or areas
- Do not base your treatment decision just on the presence of honeydew

ALION™ Performance and Stewardship Update

Russ Perkins
Bayer CropScience
Tech Service

Alion™ has a proven history of effective weed control without crop response. More than 700 Alion trials have been conducted over the past eight years. Alion demonstrated outstanding crop safety across all trials, which included a variety of crops and geographies. Alion has an excellent environmental safety profile, is safe to handle as directed, and carries a **Caution** signal word.

Alion Overview and Benefits

Long-lasting Alion herbicide provides a unique solution for pre-emergence control of a broad range of grass and broadleaf weeds, including ALS-, ACCase-, triazine- and glyphosate-resistant species. Alion is available for use in established citrus, table and wine grape, pome and stone fruit, and tree nut crops, including pistachio, and olives (check local labels for specific details). The unique chemistry in Alion features a cellulose-biosynthesis inhibitor as its active ingredient. Alion consists of stable molecules and has low solubility, which minimizes soil leeching. Easy-to-use, Alion features a low use rate and can be applied up to 14 days before harvest (7 days for citrus) with results lasting over six months.

Alion had a successful launch in citrus, pome, stone, tree nuts, and pistachios showing good performance and few issues. Recent revisions of Indaziflam label accepted by EPA (accepted 8-15-12) include:

Restriction from soils containing 20% or greater gravel content for any labeled crop (originally 40%)

Addition of grapes on printed label: (more restrictive than other crops)

Applications to tree nuts reduced to one year (except pecan, 3 years)

Previous rate structure based on soil type was removed from Tree Nuts, Pome, Stone, Pistachio, and Olive (5-6.5 oz regardless of soil type)

Alion Stewardship

Bayer CropScience was made aware of a few potential crop response situations where Alion herbicide was applied to pecans. Reports were limited to four sites – two in Arizona and two in New Mexico. Bayer CropScience is working with New Mexico State University and the University of Arizona to better understand the situation. **When used in accordance with the current label, there have been no reports of any crop response, including pecans, to Alion**

in any other locations. Further investigation is underway to determine whether other factors such as soil characteristics, environmental conditions, and rainfall/irrigation amounts caused or contributed to the response. Most locations have different environmental, climactic and soil conditions than those found in Arizona and New Mexico. Bayer CropScience is doing all it can to understand the situation in Arizona and New Mexico and will make adjustments to the Alion label, if warranted, to insure it continues to be safe to the crop and to the environment.

Pecan Weevil Update for West

Brad Lewis
New Mexico State University
New Mexico Department of Agriculture

Pecan weevil (*Curculio caryae* (Horn)) is arguably the most significant arthropod pest of pecan. Although the majority of the southern pecan growing areas of the country are infested, pecan weevil has not established in the western pecan growing areas of West Texas, New Mexico, Arizona, and California. It is, however, continually introduced into the region in in-shell product through normal traffic flow. Pecan weevil infested pecans can be carried with super sacks, boxes, shakers, pruning equipment, and as part of commercial pecan product. Currently New Mexico is actively eradicating pecan weevil in three localized areas, and has eradicated it in four other locations in previous years. Average time to eradication from detection to completion of the program is approximately six years.

As a result of the continued movement of pecan weevil into the western region, local pecan and regional associations have funded and worked with their state departments of agriculture and with their land-grant universities on a pecan weevil survey program. Annually, pecan weevil inspections are conducted at farm cleaning plants and buying stations in all of the major western pecan growing areas. If pecan weevil is found to be associated with a specific orchard, specialists work with the owner on an insecticide based program to control emerging adult weevils. Normally there is no charge to the owner for pecan weevil eradication efforts.

In addition to active pecan weevil surveys, each western state has enacted quarantines to restrict the movement of in-shell pecan and pecan related equipment without treatment or cleaning. Individual quarantine regulations can be found on each state's department of agriculture web page.

Everyone in the western pecan growing community has an economic interest in keeping the region free of this pest. Widespread infestation of pecan weevil in the west will result in increased production costs, lower profits, and possible loss of in-shell markets. An excellent source of pecan weevil information can be found at http://pecan.ipmpipe.org.

47th ANNUAL WESTERN PECAN GROWERS ASSOCIATION CONFERENCE SPEAKERS

March 3-5, 2013

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