THE SAMUEL ROBERTS NOBLE FOUNDATION

AG News and Views

A monthly publication of the Noble Foundation's Agricultural Division

Volume 31 / Number 10 / October 2013

HORTICULTURE

Pecan research moves into the 21st century

by Charles Rohla / ctrohla@noble.org

For decades, scientists have used molecular markers for research and breeding purposes to increase yields and water and nutrient efficiencies as well as disease and insect resistance in agricultural crops. Recently, pecan scientists have looked at the development of new technologies used in this research and considered its use in pecan breeding and research.

During the first International Symposium of Pecans and Other *Carya* in Indigenous and Managed Systems, scientists from around the world working on pecans and other *Carya* species (hickories) shared the most up-to-date research techniques that are being used to move pecans into the 21st century. Researchers from the United States, China, Argentina, Mexico, Uruguay and Israel were in attendance.

Several institutions have already started to look at the genetic potential of pecans. The use of genetics will help us understand how pecan trees function and reveal potential production problems such as the causes of alternate bearing, flowering, and disease and insect resistance. With the aid of these tools, breeding programs will be able to shorten the time required to evaluate crosses before they are released. Traditionally, pecan breeding is a long-term effort. After a cross is made, the nut is grown and allowed to fruit, which may take eight to 12 years. Evaluations are made following fruiting. If the cross is worthy, it is grafted into a replicated trial to compare it to other crosses and known cultivars. Normally, a new cultivar is evaluated for at least 12 to15 years before it is even considered for release, but in reality most cultivars are evaluated for a much longer period. "Hopi" is an excellent example of the length of time that it takes for a sound evaluation to occur at a breeding program. Hopi originated from a cross in 1939, but was not released until 1999.

The Noble Foundation is planning to use genetic resources in a breeding program to develop pecan cultivars ▸

that will be disease and insect resistant, have a more uniform yearly production, and be more water and nutrient efficient. These are all traits that have been introduced into grasses and legumes by breeders at the Noble Foundation. The use of molecular markers has reduced the time required to release a new cultivar by half when compared to the length of time required for traditional breeding in grasses and legumes. The Noble Foundation has long been a leader in plant genomic research and now has started evaluating pecans using these genomic tools that have been successful in legumes and grasses.

The focus of the program will not be on development of genetically modified organisms in pecans, but to better understand the diverse genetic potential of pecans that can be used for improvement of the species. ■

Resource management optimizes land use and profit potential

by Job Springer / jdspringer@noble.org

This article originally appeared in the October 2010 Ag News and Views *newsletter.*

It has been a long time since profits from agricultural activities have justified the price of land. Escalated prices are often attributed to speculation, but with a fixed land resource and a growing population, the price of land is likely to continue to increase over the coming decades.

For many agricultural producers, land is the highest valued asset on their balance sheet. Therefore, it is very important to maintain the viability and integrity of the land from a value standpoint, while still achieving the production, landscape and quality-of-life goals of the owner.

With the impact of the "The Great Recession" that began in December 2007, many agricultural producers are looking for ways to improve their bottom line. There are two ways to do so: cut costs or increase revenue. Neither one is typically easy to do for an agricultural producer. Even though farmers and ranchers are very resourceful people, much of what they produce is sold as a commodity. Thus, producers typically receive a non-differentiated price while costs are already kept at a minimum.

When I am trying to help an agricultural producer increase profitability, I first start with their largest expense category. In most cases, this is the cost of land. While refinancing a land note at a lower rate is a possibility, there is a different strategy available to help the bottom line. Namely, one should consider production activities that can provide economic benefits while minimally impacting other agricultural enterprises conducted on the land.

It's often said that a combination of production activities is better from both risk and profit standpoints. Some alternative production activities, such as developing wildlife hunting leases, establishing agritourism, leasing pecan harvest of productive native trees, establishing a wind energy or mineral lease, and developing novel marketing plans for produced goods, have little additional cost associated with them.

Other activities to capitalize on existing land resources, but which would require additional capital include improved pecan orchards, production of meat goats, and production of fruits or vegetables. While additional capital is required, these activities are more of a complement to the overall operation than a substitute for existing activities.

If one of these ventures is being considered, it is important to evaluate the operation's ability to manage the new endeavor. Additionally, it is important to know how much additional time and paperwork would be necessary to see the venture to completion. Brainstorm with a consultant about other enterprises that would work well with your current operation and how to turn produced goods into differentiated products that demand a premium price.

It is important to remember that your land is valued based on the perceived future value of its optimal earning possibilities. It is fine to use the land for less than its highest possible combination of activities, but money is being left on the table, or in this case, in the soil. ■

Manure scoring determines supplementation needs

by Robert Wells / rswells@noble.org

By October, winter is just a few pages away on the calendar. With the change in season and forages entering dormancy comes the need to pay closer attention to your supplementation strategy to ensure cows do not lose body condition.

The perennial question of "How can you keep a cow from losing condition without overfeeding her?" can be answered fairly accurately by looking at the manure pat. When combined with other estimates such as forage availability and quality, a diet can be quickly changed to meet the cow's nutrient requirements rather than waiting for body condition to fall low enough that the producer will notice a change. Manure scoring can indicate the quality of nutrition a cow has had in the past one to three days, while body condition score will indicate the nutritional history of the past several weeks to months.

Manure is scored on a 1 to 5 basis, with a score of 1 being very fluid and 5 being extremely dry and segmented. The next few paragraphs will detail each score and associated diet quality. Reference photographs have been included with approximate levels of dietary protein and energy (TDN) listed.

A manure score of 1 is of cream soup consistency. It can indicate a sick animal or a highly digestible ration that contains excess protein, carbohydrates or minerals, and low fiber. The addition of hay will slow down the rate of passage and thicken the manure.

Manure that will score a 2 doesn't stack; the pat is usually less than 1 inch thick and will lack consistent form. This manure has the consistency of cake batter. Excess protein, carbohydrates and low fiber characterize the diets that produce this manure. Rate of passage is very high, and adding hay to this diet will slow it down to allow for more absorption in the intestinal tract.

Manure score 3 is ideal and will typically start to take on a normal pat form. The consistency will be similar to thick pancake batter. It will exhibit a slight divot in the middle. The pat will be deeper than a score 2 pat, but will not stack. This diet is not lacking nutritionally, yet is not in excess for the cow and her physiological stage.

Score 4 manure is thick and starting to become somewhat deeper, yet is not stacking. The consistency of the manure will be equivalent to peanut butter. This manure indicates a lack of degradable rumen protein, excess low quality fiber or not enough carbohydrates in the diet. Supplementation of additional protein with high rumen-degradable protein can increase total diet digestibility. Cottonseed meal and soybean meal are excellent sources of this type of protein.

The highest and least desirable score is 5. This manure is firm and stacks over 2 inches in height. It will also have clearly defined segments and is very dry. This manure indicates the cow is eating a poor quality forage diet that is inadequate for protein and carbohydrates, and high in low quality fiber. Rate of passage has slowed down to the point that excess water has been reabsorbed in the intestines. The rancher will need to consider additional supplementation to meet the cow's protein and energy requirements.

Cattle have to be in good health for manure scoring to be accurate. Manure scoring is a valuable tool to determine the quality of nutrition the cow has recently consumed and can be used effectively to adjust supplementation to prevent loss of body condition. ■

Score 2: >20% CP; >68% TDN of diet

Score 3: 12-15% CP; 62-70% TDN of diet

Score 5: <6% CP; <55% TDN of diet

Five basic principles increase soil health

by Chad Ellis / crellis@noble.org

Are you a cattle

manager, a grass manager or a soil manager? Many cattlemen view livestock as their base crop through the sale of beef. Others view grass as their base crop. While management of breeding, vaccinations and marketing is important, all livestock need forage to produce pounds of beef. This forage is, in turn, heavily dependent on the health of the soil. Consequently, the management of soil health, specifically the biological components, is of vital importance to producers as it is the dynamic resource that supports plant life.

As managers, we often focus on managing the aboveground production in our pastures while paying little attention to what happens belowground. Microbial action in the soil builds natural fertility that increases plant production. Sound grazing management is the art of capturing sunlight and water while recycling the aboveground parts of the plant through livestock. The animal eats a portion of the plant which is then deposited as urine and manure. The remainder of the plant is trampled into the ground to begin decomposition into the soil. This feeds the soil microbes that in return feed the plant. The manure, plant organic matter and carbon dioxide captured from the air by the plant combine to build a carbon bank in the soil that holds water and nutrients for plant use.

Building soil health can be accomplished by employing five principles.

1. Armor the soil.
2. Minimize soil disturbance.
3. Increase plant diversity.
4. Keep living roots in the ground all year.
5. Integrate livestock grazing.

Armor the soil

Bare ground is enemy number one and is detrimental because increased soil temperatures caused by the lack of soil cover can decrease and even kill biological activity. Once soil temperatures reach 140 degrees Fahrenheit, soil bacteria die. The soil must be covered to minimize bare ground; this is accomplished by forage and crop residue.

Minimize soil disturbance

Physical soil disturbance such as plowing and overgrazing can result in bare ground and compacted soils that disrupt soil microbial activity. Incorporating reduced tillage methods in cropping systems and proper grazing management in pastures will keep soil covered.

Increase plant diversity

Increasing plant diversity aboveground allows for a more diverse underground community. Specific soil microbes require specific plant types. The more diverse the microbial population in the soil, the better the forage will respond, due to increased biological activity.

Keep living roots in the ground all year

Soils are most productive when soil microbes have access to living plant material. A living root provides a food source for beneficial bacteria and promotes the symbiotic relationship between plant roots and mycorrhizal fungi. This is aided by increased plant diversity, which can be achieved by incorporating cover crops into your pasture and crop systems.

Integrate livestock grazing

Grasses evolved under grazing pressure. Soil and plant health is improved by grazing, which recycles nutrients through improved manure distribution, reduces plant selectivity and increases plant diversity. The most important factor in grazing systems is to allow adequate rest for the plant to recover before being grazed again.

The primary goal of a rancher should be to improve soil health. As more grass is grown, more organic matter is available to recycle into the soil for feeding microbes. This captures and holds more water and nutrients, growing more and larger plants that can gather more sunlight to power the process. This constant recycling is dependent on the animal and your knowledge of managing grass growth.

The health of our landscapes and soil health are interdependent. Our land's condition is characterized by the functioning of both the soil and the plant communities. Following these five principles will allow the site production, health of the soil, and mineral and water cycles to greatly improve, resulting in an increase of forage production and animal production. ■

Management increases chance for trophy bucks

by Mike Porter / mdporter@noble.org

Most deer hunters, including me, are fascinated with large antlers. We generally want to see or harvest bucks with large antlers. "Trophy buck" is commonly used to describe a buck with large antlers; however, trophy buck means different things to different people. It might mean a buck with larger antlers or body size, or more antler points or spread than previously seen or harvested by a hunter; it might be a hunter's first buck; it might be the largest buck harvested by a hunter with a bow; or it might mean a buck with antlers larger than a certain Boone and Crockett score. All are valid definitions of a trophy buck. Nevertheless, this article focuses on increasing the abundance of bucks with gross antler scores greater than 150 Boone and Crockett points.

Hunters and managers should have realistic expectations. Most bucks will not develop antlers grossing more than 150 Boone and Crockett points during their lifetimes. Average antler scores for mature bucks in Oklahoma and Texas are in the 130s, so only a few bucks have the optimum combination of genetics, nutrition and age to become trophies.

For a hunter to see or harvest a trophy buck, it must first be present, and then a certain amount of luck and skill is required. Many properties do not have a buck with antlers scoring greater than 150 Boone and Crockett points. However, in several situations, this is something that can be rectified by managing deer habitat and harvest on enough acres.

Good habitat has abundant, diverse native forbs, woody plants and grasses that provide adequate nutrition and cover. Some naturalized plants and even crops can be part of good habitat, but the bulk of habitat should be native plants.

Deer numbers should be managed through adequate doe harvest to maintain a relatively even adult sex ratio and keep deer abundance within carrying capacity so deer nutrition, health, reproduction, antler size and body size do not suffer. Sex ratio is important because each property supports a limited number of deer. Trophy managers want as many as possible to be bucks to increase the likelihood that some have the genetics, nutrition and age for large antlers.

For optimum trophy management, less than 15 percent of the antlered buck population should be harvested annually to allow many bucks the opportunity to grow to maturity. Typically, a buck does not demonstrate his largest set of antlers until 4 to 9 years old. Ken Gee's 24 years of work with tagged wild deer at the Noble Foundation Wildlife Unit indicated most white-tailed bucks grew larger each year that they lived (versus penned deer studies, which indicated buck antler growth peaked at 4 to 5 years old).

Recent research at the King Ranch and Comanche Ranch indicates culling bucks in a free-ranging population is not an important or beneficial practice (see www.noble.org/ag/wildlife/cullingbucks for more information).

Habitat and harvest management should occur on a large enough area to provide a reasonable chance to produce a trophy. This can be accomplished by owning, leasing or managing adequate acreage, or by working with neighbors through an association or cooperative (see www.noble.org/ag/wildlife/small-landowners for more information). Chances of producing a trophy buck improve as the amount of acreage increases with appropriate habitat and harvest management. ■

Expenses add up when raising replacement heifers

by Job Springer / jdspringer@noble.org

The Southern Great Plains has seen better forage growing conditions in 2013 than in many recent years. This has been, in part, due to less wind, cooler temperatures and more rainfall. Many ranchers are beginning to chomp at the bit to use these additional forages and are thus looking to rebuild their cow herds. For ranchers looking to rebuild their herds from within the ranch, the question arises as to how much it will cost to raise their own replacement heifers. While every ranch has its own set of unique resources, this article addresses the question of how much it will cost an average-sized ranch in the Southern Great Plains to raise replacement heifers in 2013 and 2014.

According to the 2007 Census of Agriculture, the average herd size in the Southern Great Plains is approximately 43 head. A rancher trying to expand his herd will need to exceed the typical attrition rate of 17 percent (seven head). In this example, 14 heifers will be used as the initial selection number of potential replacement females.

Replacement heifers need to be approximately 65 percent of their mature weight at the time of breeding. Therefore, a typical herd in the Southern Great Plains would see heifers being bred around 750 pounds. This is a pivotal point when the rancher can either sell a feeder heifer or decide to keep the heifer on the farm as a replacement A spring-calving cow herd will see many heifers being covered as early as March or April. According to the futures market, these 750-pound heifers would be worth $151 per hundredweight or $1,132.50 per head.

During the next nine months, several operating costs will be incurred by the ranch, including use of owned or leased forage at $162 per heifer; supplemental feed when standing forage is limited or requires supplementation at $79.20 per heifer; free-choice mineral at $39.15 per heifer; pre-breeding vaccinations, fly control and dewormer at $8 per heifer; a 1 percent death loss at $14.24 per heifer; sickness at $1.25 per heifer; a pregnancy test at $6 per heifer; labor at $207.92 per heifer; breeding bull's annual depreciation at $36.79 per heifer; and the annual cash expenses associated with the bull at $42.86 per heifer. The accumulated expenses so far are $1,729.91 per heifer.

Other expenses are incurred to the ranch when replacement heifers are raised on the ranch. These expenses include a loss on replacement heifers that were not bred or abort at $48.34 per heifer; utilization of ranch resources during the year a replacement heifer is raised instead of running productive cows at $112.50 per heifer (raising replacement heifers, instead of purchasing, displaces productive cows or other livestock); and a forgone implant at weaning of heifer calves that would have added weight and value had the heifer been sold at $46.30 per heifer (replacement heifers should not be administered an implant).

When all expenses are considered, the average-sized ranch in the Southern Great Plains will have approximately $1,937 tied up in each productive replacement heifer produced on the ranch in the coming year. Many ranchers have experienced sticker shock when they have priced replacement heifers from other ranches. However, if a rancher is able to locate replacement heifers elsewhere at a lower price, it would be worth considering the outside purchase, depending on the goals of the operation.

A similar evaluation should be made on your respective operation to determine whether or not it makes economic sense to raise or purchase quality replacement heifers.

Please feel free to contact me with any questions you might have at jdspringer@noble.org. ■

New testing methods measure soil organics

by Jim Johnson / jpjohnson@noble.org

Have you ever

seen a fairy ring of toadstools in a pasture or a pasture with "cow pox" wherever there were urine or manure spots? Chances are that you have. Have you ever taken soil samples inside and outside those fairy rings or cow pox spots? Chances are that you have not, but I have. What I found, more often than not, were no differences in the soil test results, even though there were obvious differences in the growth of the grass in these areas. So how can we reconcile what we see in the field with what we see on the soil test report?

To answer this question, it might be helpful to have a brief refresher on how soil testing has been done for the past 60 years. Traditional soil test methods have typically involved treating a soil sample with various acids and other reagents to extract a portion of the inorganic nutrients in the soil. This can hopefully be done with as few processes as possible to be fast and cheap, and fit the industrial model. In the end, theoretically, the amount of inorganic nutrient extracted and measured is correlated with the amount of inorganic nutrient available for plant growth; this is almost always true.

Notice in my explanation of soil testing, I said inorganic nutrients. Could it be that the organic portion – which is not normally measured – is what accounts for the difference in growth we see in fairy rings and cow pox when a traditional soil test does not show a nutrient difference? Are there soil tests to measure this organic portion? I believe the answers are yes and yes. I say this because there are two relatively new soil testing methods that seem to explain the differences seen in plant growth when traditional soil tests show no difference in nutrient availability.

One of these is the Haney soil test. Basically, the Haney test measures total nitrogen (N), ammonium N and nitrate N; and extracted elemental phosphorus (P) and orthophosphate P; along with other nutrients in the soil sample. Theoretically, total N minus ammonium N minus nitrate N can be used to determine organic N, and elemental P minus orthophosphate P can be used to determine organic P when using the proper mathematical equations. While conventional soil tests typically only account for nitrate N, Haney accounts for all sources of plant-available N and similarly for P. The other test is the Solvita® test which measures carbon dioxide (CO_2) released from a soil sample. To oversimplify, the CO_2 released is a measure of soil microbial activity which is a measure of organic matter and organic nutrients.

Using these two tests together seems to give a better representation of the nutrients in the soil that are available to plants. They also correlate well with the differences in plant growth that are sometimes seen, but not explained, by traditional soil tests.

One potential benefit of these tests is the ability to measure changes that livestock and crop production management decisions are having on soil health. Another benefit of these tests is that they can potentially show farmers and ranchers additional opportunities to reduce the amount of fertilizer they need to purchase and use without reducing yields, even beyond what is shown on a traditional soil test. This can obviously be very good for the environment as well.

For more information on these tests and to find laboratories that offer them, go to solvita.com and 1.usa.gov/14Aa0Fz or search the Web for Rick Haney soil test. ■

CONTENTS

Page 1
Pecan research moves into the 21st century

Page 2
Resource management optimizes land use and profit potential

Page 3
Manure scoring determines supplementation needs

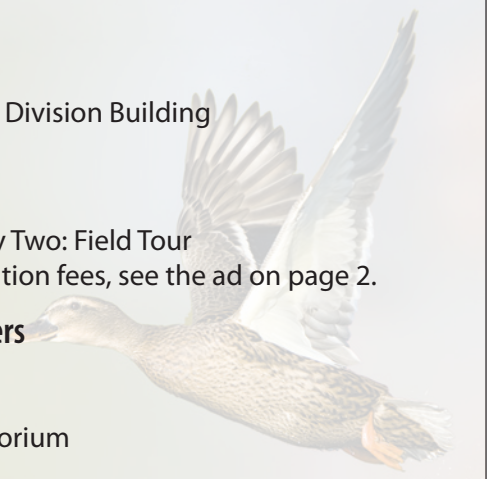
Page 4
Five basic principles increase soil health

Page 5
Management increases chance for trophy bucks

Page 6
Expenses add up when raising replacement heifers

Page 7
New testing methods measure soil organics

EVENTS



Waterfowl Management Tour
Time: 1 p.m.-5 p.m.
Date: Oct.15, 2013
Location: Noble Foundation Agricultural Division Building
No Registration Fee

Basic AG Hoop House Symposium
Oct. 23, Day One: Workshop; Oct. 24, Day Two: Field Tour
For more details on location and registration fees, see the ad on page 2.

Managing Taxes for Agricultural Producers
Time: 1:30 p.m.-4:30 p.m.
Date: Dec. 10, 2013
Location: Noble Foundation Kruse Auditorium
No Registration Fee

For more information or to register, please visit www.noble.org/agevents/ or call Jackie Kelley at 580.224.6360. Preregistration is requested.

Ag News and Views is published monthly by the Agricultural Division of The Samuel Roberts Noble Foundation. Current and past editions of *Ag News and Views* are available at www.noble.org/ag/news-views/. Free subscriptions delivered by email are available at www.noble.org/ag/news-views/sign-up/. The Noble Foundation encourages the republication of *Ag News and Views* articles. For publication guidelines contact J. Adam Calaway, Director of Communications at jacalaway@noble.org. High quality electronic versions of photos and graphics are available.

THE SAMUEL ROBERTS NOBLE FOUNDATION
The Samuel Roberts Noble Foundation
2510 Sam Noble Parkway
Ardmore, Oklahoma 73401
Phone: 580.223.5810

Address Service Requested

Non-Profit Org
U.S. Postage
PAID
Permit No 2000
Okla. City, OK