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Louisiana Soybean & Grain

RESEARCH AND PROMOTION BOARD REPORT

2017

CONTENTS

Weed scientists evaluating new herbicide systems

Three new herbicide systems — including one now commercially available and two expected to be released soon — could give Louisiana farmers much-needed tools to fight the resistant weed populations they have struggled with in recent years.

But LSU AgCenter weed scientists warn that the new products, which they have been evaluating in field trials, will only be helpful in the long run if they are used carefully and in combination with other herbicides and good management practices.

Among the most difficult to control weeds in Louisiana and many other states is Palmer amaranth, a prolific seed-producing plant also called pigweed that often cannot be killed with glyphosate-based herbicides. Glyphosate is an ingredient in some of the most popular herbicides. Farmers have relied too heavily on the chemical, and weeds such as Palmer amaranth, johnsongrass and Italian ryegrass have developed a tolerance for it in the past few years.

Those weeds can be controlled with other herbicides, such as dicamba and 2,4-D. The problem is that herbicides also can kill crops, so they cannot be applied on weeds that pop up during the growing season — unless they are used as part of a system with crops containing genetic traits that safeguard them from a certain herbicide.

Glyphosate is used in the Roundup Ready system. The Xtend system, which includes dicamba and soybeans that can tolerate dicamba, recently came on the market. A similar system, called Enlist, uses 2,4-D and has yet to be commercially released.

AgCenter weed scientist Daniel Stephenson has been studying the effectiveness of Xtend and Enlist, among other technologies. While both show promise, he said, they work best in cases where pre-emergence herbicides had already been applied to the soil before planting.

Eliminating weeds as early as possible is critical, said AgCenter weed scientist Donnie Miller, who has been evaluating Balance GT, another soon-to-be-released technology. That system includes soybeans with a trait allowing pre-emergence applications of Balance Bean and over-the-top applications of glyphosate.

Balance Bean is an isoxaflutole-based herbicide that kills weeds by blocking an enzyme commonly known as HPPD, which stands for 4-hydroxyphenylpyruvate dioxygenase.

"It will essentially get the weeds before they ever emerge, whereas with glyphosate, dicamba and 2,4-D, the weeds have to be sprayed," Miller said. "When you're ready to make your application and weeds are at the optimum size, you always have that chance of a rain coming in and delaying you. You've gone from spraying optimum-size, 1- to 3-inch weeds to spraying 6- to 7-inch weeds."

The arrival of additional ways to control weeds is good, but not because any of the new products alone are a perfect solution. Rather, having more options helps farmers combat not only weeds, but also the problem of herbicide resistance.

HPPD-inhibitor herbicides like Balance Bean — a relatively recent development in the weed science field — offer a mode of action different from any others currently available. Incorporating multiple modes of action is "the basis for any good resistance mitigation program," Miller said.

Using more than one product and making both pre- and post-emergence applications also ensures better results overall, so long as label directions are carefully followed and spraying equipment is thoroughly cleaned to avoid unintended herbicide injury, Stephenson said.

"There's a false assumption that dicamba, which can be used in the Xtend technology, is essentially going to be a silver bullet for resistant pigweed," Stephenson said. "It is not."

He added: "We have to protect this technology. If you ride the dicamba horse and that's all you're using, we're going to follow the same path we did with glyphosate and end up with resistance."

Farmers also should consider implementing weed control practices following harvest. Josh Copes, AgCenter field crop production specialist, has begun a project to study how post-harvest decisions affect the soil seed bank and weed populations.

He wants to find out if late-season herbicide applications in corn can delay when farmers have to get back in their fields to control weeds to prevent weed seed production after harvest.

"A lot of weed seed is being produced after harvest, especially with corn. Corn comes off as early as mid- to late-July in some cases," Copes said. "That's a long period of time for weeds to germinate, go to seed and create big problems for future crops in those fields."

He also is looking at how the timing of mowing and disking fields after harvest affects weed seed production and how herbicide program intensity influences the seed bank.

Olivia McClure

LSU AgCenter weed scientist Daniel Stephenson holds a ragweed parthenium plant at the annual field day at the Dean Lee Research and Extension Center in Alexandria. Photo by Olivia McClure

From the Louisiana Soybean and Grain Research and Promotion Board

The Louisiana Soybean and Grain Research and Promotion Board directs your checkoff funds to research projects that address Louisiana's most important production and marketing issues. The projects represent comprehensive efforts to address short-term or immediate needs of the industry and long-term recurring work for sustainable soybean production systems.

The board administers Louisiana's wheat and corn checkoff and the national checkoffs for soybeans and grain sorghum in Louisiana. By working with the national programs, the board is able to obtain funds for research specific to Louisiana's needs. The board works in collaboration with regional and national organizations for opportunities to cost-share in projects specific to Louisiana. This approach allows your funds to more efficiently support projects that will identify solutions to increase production or reduce input costs. These partnerships are particularly important as federal and state research funds become more limited.

Yield and quality issues affecting the Louisiana soybean and grain industries are a moving target, and every year is different. The funded projects have to be flexible to address emerging issues and develop quick solutions. Projects evaluate existing recommendations and adapt novel technologies to manage production-limiting factors. Just as important are the long-term projects to develop varieties or specific traits for Louisiana's environment. In this publication you will find research summaries on topics from soil testing to irrigation, diseases to insects, and feral hogs to drones. This report describes some of the activities funded by your checkoff dollars.

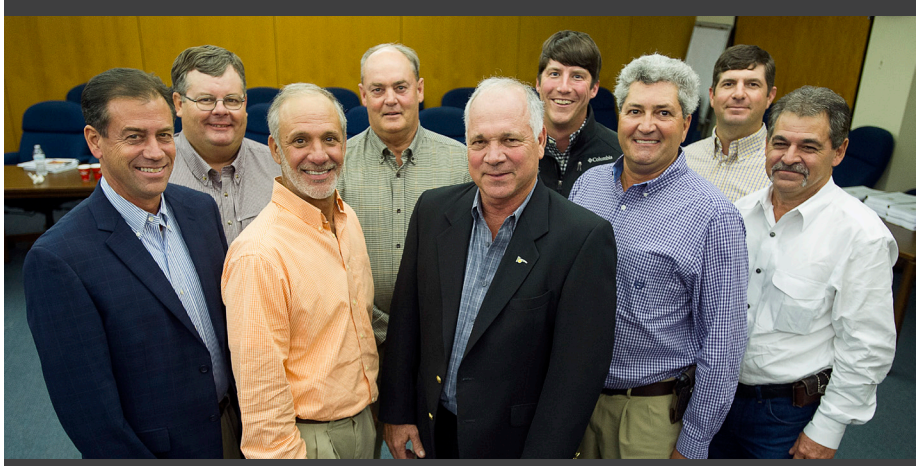
Board members are nominated by Louisiana's grower organizations with the final appointments made by the governor's office. Several new board members were welcomed to the group this year, including Scott Wiggers (Franklin Parish), Glen Brown (East Carroll Parish), Kim Frey (Acadia Parish), Damian Glaser (Pointe Coupee Parish), Garrett Marsh (Madison Parish), and Dustin Morris (Richland Parish). In addition, we wish to thank these retiring members who served on the board for many years: Ray Schexnayder (former chair), Joey Olivier, Leo Franchebois, Robert Thevis, Ryan Kirby and Donald Berken.

We encourage you to get involved in the checkoff programs. The next board meeting, November 16 to 17, 2017, in Baton Rouge at the LSU AgCenter, will include reports on funded projects and reviews of new proposals. On behalf of the board, I thank you for your support of these programs.

Sincerely,

Charles Cannatella,

Chairman, Louisiana Soybean and Grain Research and Promotion Board



Soybean and Grain Research and Promotion Board members are from left to right back row: *Darrell Vandeven, Dan Turner, Thomas Ater, Ryan Kirby. Front row from left to right:, Carlos Polotzola, Charles Cannatella, Raymond Schexnayder Jr., Joey Olivier and Leo Franchebois. Not pictured, J.K. Bordelon, Scott Wiggers Jr., Glen Brown, Kim Frey, Damian Glaser, Garrett Marsh and Dustin Morris. Photo by Olivia McClure*

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Soil amendments, helpful bacteria may improve soybean plant health

Experimenting with foliar and soil applications of different materials, Jong Ham, LSU AgCenter plant pathologist, is studying different ways of improving soybean health to increase yields.

Soil amendments could boost a soybean plant's overall health, and a healthier plant could have the ability to withstand disease better, he explained.

Ham is using DNA sequencing technology to analyze microorganisms in the soil to find which ones have beneficial effects for soybeans. Those bacteria are sprayed onto the plant's leaves.

"We are in search of new bacteria that will inhibit soybean pathogens from infecting the plants," he said.

The work has revealed more than 100,000 species of microorganisms in the soil, and 1,900 have been tested so far, he said. Five of those show potential antibacterial qualities, and 11 have possible antifungal characteristics.

Testing last year also showed that biochar suppressed some nematodes, and poultry litter showed some potential for nematode control. Yield was highest in plots treated with biochar and poultry litter, Ham said.

Plants treated with Quadris fungicide had the lowest number of leaves with Cercospora and frogeye leaf spot. A one percent solution of acetic acid also showed promising results against Cercospora, he said.

Ham also is studying the use of chitosan, a byproduct of shellfish, in foliar applications to find if it could protect plants against disease. So far, the degree of protection has been limited, he said, but the research will continue. **Bruce Schultz**

Study compares corn yield loss with incremental defoliation

LSU AgCenter plant pathologist Clayton Hollier is evaluating the damage suffered by corn plants due to wind, hail, insects and disease to determine the effects of incremental defoliation of the crop.

"What we are doing with this project is mimicking pest and environmental damage with incremental defoliation by taking out different levels of leaves at different points in the growing stages," Hollier said.

In the study, the results have shown that yields are affected when defoliation has occurred, he said.

The goal of the research project is to determine how and when to treat for disease in the corn plant that would occur under normal field conditions.

The process shows how defoliation of the plant from nature can allow the development of diseases to attack the plant.

"One of the causes of defoliation, especially in corn up north, is usually hail damage. And here we have occasional wind damage that tends to shred the leaves followed by disease," Hollier said.

The treatments for the study are to take out the lower leaves or the leaf just under the corn ear. Other treatments take out leaves that are higher levels depending on the growth stage.

The two plots where the study was conducted were in Baton Rouge and Alexandria. This is the second year of the study, and Hollier hopes to continue in order to have at least three years of data.

"This not an expensive study, but it is time-consuming because the leaves have to be hand clipped and the corn has to be hand harvested in order to have standard results," he said.

The idea for the study began several years ago when a graduate student looked at the effects of defoliation in wheat, Hollier said.

Once the study is completed, Hollier hopes to have data to show the best time to treat for insects or diseases.

"We want to know when the best possible time to spray occurs," he said. "By checking at different corn growth stages, we are able to tell when the most optimal time for spraying is in order to decrease the amount of losses."

The results of the study are not so much about the loss of leaves, but more about the percent of loss from the entire plant.

"We are more interested in studying the reproductive stages of the plant, rather than just looking at the vegetative stages of growth," he said.

The study will help growers know when they should be spraying in order to minimize yield loss, Hollier said. **Johnny Morgan**

Researcher seeks to control stink bugs without increasing soybean loopers

LSU AgCenter entomologist Jeff Davis, right, shows field day attendees insect damage on a soybean plant at the Dean Lee Research and Extension Center in Alexandria. Photo by Olivia McClure

Photo by Dr. Matthew Baur, formerly of the LSU AgCenter, Entomology Deptartment

LSU AgCenter entomologist Jeff Davis is working on methods of controlling redbanded stink bugs without increasing soybean looper populations.

Pyrethroid insecticides are one of the best ways to control redbanded stink bugs, but loopers are resistant to the chemical, which kills beneficial insects that prey on loopers. Acephate also is effective against stink bugs, but it also has the downside of increasing loopers.

"When you remove all beneficial predators, the looper population grows exponentially," Davis said.

Loopers don't overwinter in the U.S. The moths migrate on winds sweeping out of the Caribbean islands and Mexico where high doses of pyrethroids have resulted in resistant populations.

"There are some populations resistant to all products available for control," Davis said.

Insecticides for stink bugs and loopers — such as pyrethroid for stinkbugs and a diamide for loopers — can be tank-mixed and sprayed simultaneously, Davis said. But the loopers tend to feed deep within the soybean canopy and may be missed by sprayed applications. Some equipment modifications are possible for spray rigs to ensure loopers are controlled with these applications.

Insecticide residue on plants is likely to be removed by frequent rains this year, Davis said.

Tests of different insecticide combinations are being conducted this year at the Ben Hur Research Station near Baton Rouge, the H. Rouse Caffey Rice Research Station near Crowley, the Dean Lee Research Station near Alexandria and the Sweet Potato Research Station in Chase.

On-farm testing also will be conducted throughout the state at locations that typically have high stink bug and looper infestations.

Loopers tend to start showing up in southern parishes first, Davis said, and the highest numbers usually occur in August.

Loopers' natural enemies include a parasitoid wasp and spiders, but both are killed by pyrethroids. Davis is also conducting research on how effective these predators are against loopers. **Bruce Schultz**

Protein discovery could improve soybean response to Cercospora

A recent discovery by an LSU graduate student could help boost the soybean plant immune system.

Zhi-yuan Chen, LSU AgCenter plant pathologist, is working on different approaches for boosting soybean resistance to Cercospora.

One of his graduate students, Josielle Rezende, found a protein that the Cercospora fungus uses as protection against a soybean plant's defense mechanisms. A soybean plant could have its immune system boosted by inserting part of the fungal gene for making that protein, stimulating the plant to recognize the protein as an infection.

Chen said Iowa State University is working with the AgCenter on this project, and additional genes have been found that can be used in combinations to increase efficacy, he said.

He also is working on spraying the intruder protein's DNA on a plant's leaves to build up a plant's immunity.

"When the plant sees it, the plant will build up defenses," Chen said.

The DNA has to be coated with nanoparticles to make sure the liquid will adhere to the leaf surfaces, he said. Currently, the process is too expensive to be used on a commercial basis.

"Hopefully something good will come out of this work," he said. **Bruce Schultz**

Maria Izabel Costa de Novaes, a research associate working with Dr. Zhi-yuan Chen, sprays Cercospora pathogen in the greenhouse. Photo by Bruce Schultz

Scientists working to improve irrigation practices

Irrigation is one of the most important factors in achieving good crop yields.

Plants thrive when they have sufficient water. But when they don't, they become stressed, putting yields and profits at risk.

In Louisiana, the growing season is typically marked by high temperatures and droughts that prompt most farmers to irrigate. This is especially true in the case of soybeans. The summer reaches its hot, dry peak at a time when most Louisiana soybeans are approaching the growth stages when pods are filled and water is most needed.

Although irrigation is critical to a successful crop, farmers must be careful in how they irrigate. Applying too much or too little water, irrigating at the wrong time and using inefficient methods all can cut the benefits irrigation offers. These factors also pose concerns about the availability and quality of water.

A team of scientists at the LSU AgCenter Red River Research Station in Bossier City have undertaken several projects to identify ways farmers can improve their irrigation practices.

Optimizing soil moisture using technology

For irrigation to be effective, water must infiltrate the soil so plant roots can use it. Accomplishing this can be a challenge. Soil type affects how well the soil holds water, and water will run off of fields if it is applied to already-saturated soil.

AgCenter irrigation engineer Stacia Davis is wrapping up a three-year study of how soil moisture sensors and the data they collect can help farmers decide when irrigation is needed for their soybean crop. She has been working with farmers across the state to evaluate two types of sensors.

Davis' data show one type, which measures saturation in terms of pressure, works best in clay soils. Another, which indicates the volume of the water present, is better for sandy soils.

Sensors, which take some practice to use properly, have not yet been widely adopted in Louisiana. Davis said they are worth considering because the data they record offer valuable insight into when crops are stressed and need water.

"If you stress any plant, other stressors have more leverage," Davis said. "If you already have a disease issue or a pest issue or a weed issue, and then you stress the plant from water, then those other issues are going to be more prominent."

Sensors also can help farmers monitor soil infiltration, she said. For example, a farmer may need to irrigate even if it rained recently because very light or very heavy rain likely did not percolate through the soil. Conversely, a farmer may be able to delay irrigation and save money if the sensor shows the soil is already full of water.

Davis cautions farmers that sensors are only one part of the equation. Computerized hole-selection software, which uses information about specific fields to determine the best hole size and spacing for poly pipe, is another way to improve irrigation efficiency. The software helps ensure water flows down fields evenly and prevents a pipe from bursting because of too much pressure in one spot.

Irrigation affects nutrient uptake

Water makes it easier for plants to take up nutrients, which may mean fertilizer is more efficiently used in irrigated fields, said AgCenter agronomist Syam Dodla. He is in the second year of a three-year project on how AgCenter-recommended rates for nitrogen, phosphorus and potassium should be adjusted in soybeans.

Current recommendations are based on older research that largely does not consider irrigation, which was less common 20 or 30 years ago in Louisiana, or modern high-yielding varieties, Dodla said.

"Especially at the crucial stages of the crop, like flowering to pod-filling stages, if we can provide irrigation, irrespective of nutrient application, the plants can still utilize the existing soil nutrients very well and get the benefits," he said.

Dodla said irrigated crops make better use of nutrients, including those found naturally in the soil. In the current study, nutrient uptake was 22 percent higher with irrigation, he said.

Yet some previous research suggests fertilizer rates actually should be about 20 percent higher in irrigated fields.

That raises the possibility that some farmers are applying too much fertilizer. Most problematic is excessive potassium, which can interfere with plants' ability to absorb other nutrients and ultimately decrease yields, Dodla said.

In another project, Dodla is trying to identify the ideal ratio of poultry litter and inorganic nitrogen fertilizers for maximizing corn yield. He is finalizing recommendations on how much of each should be applied in irrigated and non-irrigated fields.

Poultry litter — a good source of nutrients including nitrogen, phosphorous and potassium — is readily available in northwest Louisiana. It is usually applied to pastures but is increasingly being used on cropland, Dodla said.

Water availability, quality are concerns

Much of the irrigation in Louisiana is done with groundwater pumped from wells. The alternative is using surface water, which helps slow the depletion of underground aquifers. But not all farms are located near waterways suitable for irrigation.

In northwest Louisiana, irrigation is important because droughty conditions in the summer tend to be more intense than elsewhere in the state, said AgCenter water quality specialist Changyoon Jeong. Until recently, most farmers' only option for irrigation was groundwater, further drawing down the already-strained Sparta Aquifer.

Farmers in the Gilliam area of Caddo Parish have been able to irrigate using water from Red Bayou since the 2014 completion of a Natural Resources Conservation Service project that pumps water from the Red River into the bayou, which is dry every summer. The drawback of using this water is quality. During crop season, Red Bayou has high levels of nitrogen, phosphorous and salt, Jeong said.

"In clay soil types, nitrogen and phosphorus accumulate at the top of field," he said. "In sandy soils it does not accumulate, and it actually moves down to the edge of field. Eventually you're going to lose a lot of nutrients."

For the past three years, Jeong has monitored Red Bayou water quality in an effort to find out how farmers who rely on it for irrigation can mitigate possible negative effects. Fertilizer application rates may need to be adjusted, and the use of soil amendments could be helpful. He also is trying to determine how much nutrient content is lost in runoff from individual fields.

Jeong said research on nutrient management issues with surface water is important because of the continuing decline of groundwater sources.

"If we keep using the surface water for irrigation, it's much better for the groundwater," he said.

Olivia McClure

Tube-style soil moisture sensor installed in a farmer's cotton field in Caddo Parish. It monitors soil moisture up to 48 inches and the data is accessible via a website or app. Photo provided by Stacia Davis

Water gushes from poly pipe onto soybeans at the Bob Manning farm near Ferriday during an interagency field day. Photo by Olivia McClure

Variety trials still play a crucial role for producers

Agricultural seed companies and universities spend a great deal of effort and time developing new varieties and hybrids for commodities, such as corn, soybeans and wheat. Once those varieties and hybrids are developed, many researchers plant the new varieties in test plots across their states to evaluate performance on various soil types and environmental conditions.

LSU AgCenter scientists Dan Fromme and Boyd Padgett conduct extensive hybrid and variety trials for corn, grain sorghum, soybeans and wheat, with 39 locations distributed throughout Louisiana that examine more than 30 varieties and hybrids.

Fromme, the AgCenter state corn and cotton specialist, is responsible for corn and sorghum trials. For corn, he has 19 locations throughout 15 parishes examining 11 different hybrids.

Louisiana's corn acreage has decreased this year, according to figures compiled by the USDA National Agricultural Statistics Service. Experts say Louisiana's 2017 corn crop is 470,000 acres, down 50,000 acres from 2016.

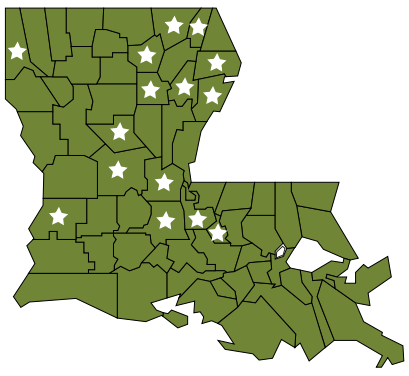
Fromme is also working with grain sorghum trials at three locations. Interest in grain sorghum has waned considerably with continued low prices and the recent emergence of the sugarcane aphid, which has hampered harvest efforts. This year's crop is estimated by NASS at approximately 12,000 acres, which would be the lowest acreage for sorghum since 1962.

Padgett took over the management of the soybean variety trials when state soybean specialist Ronnie Levy retired in April. New hire Todd Spivey assumed responsibility for the trials in July with 20 sites in 16 parishes. The majority of the plots are planted with Group IV and Group V varieties with a few plots of Group III, early Group IV and dicamba-resistant varieties.

Soybeans remain Louisiana's largest crop in terms of acreage. Louisiana has 1.2 million acres of soybeans, an increase of 60,000 acres from the 2016 crop, according to NASS.

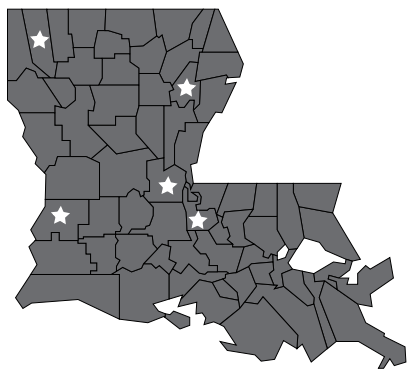
With low wheat prices and scab disease decimating the crop for three years, Louisiana had its smallest wheat crop since record keeping began for wheat in 1955. It was estimated at 17,000 acres, with 15,000 acres harvested for grain.

Padgett is continuing wheat variety trials but said finding interested growers was tough because of difficult conditions. He had five locations in five parishes. Padgett reported looking at nine different varieties in 2016. **Craig Gautreaux**



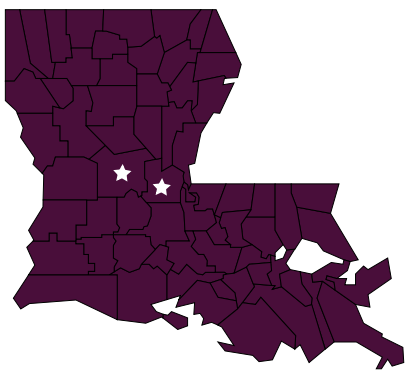
Corn

Avoyelles (3), Beauregard, Caddo, Caldwell, Franklin, Grant, Madison (2), Morehouse, Ouachita, Pointe Coupee, Rapides, St. Landry, Tensas, W. Baton Rouge, W. Carroll (2)



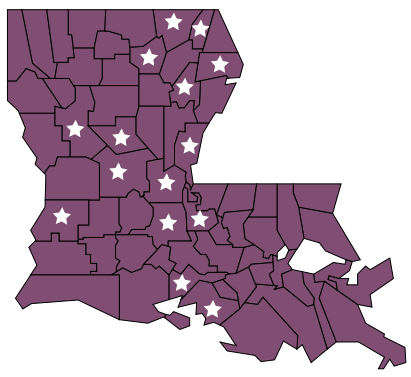
Wheat

Avoyelles, Beauregard, Bossier, Franklin, Pointe Coupee



Grain Sorghum

Avoyelles (2), Rapides



Soybean

Avoyelles (3), Beauregard (2), Concordia, Franklin, Grant, Iberia, Madison (2), Morehouse, Natchitoches, Ouachita, Pointe Coupee, Rapides, St. Mary, St. Landry, W. Carroll (2)

Soybean breeding aims to curtail Cercospora

The LSU AgCenter soybean breeding program is developing and evaluating lines that offer resistance to Cercospora leaf blight.

This strain of the Cercospora fungus, now very destructive to soybeans, has been around for more than 60 years in the United States.

"We have three lines that look pretty good in regional trials against Cercospora in multiple locations in Louisiana, Mississippi, Arkansas and Alabama," said Blair Buckley, principal investigator for the AgCenter soybean breeding program and associate director of the Red River Research Station in Bossier City. "There's some encouragement that some of these might hold up on a regional basis."

Researchers are looking for crosses resistant to Cercospora leaf blight that produce good yields. AgCenter plant pathologists have had a difficult time working with the pathogen because it rapidly adapts to different plant varieties and develops resistance to chemicals, Buckley said.

"Most of our crosses have that in mind, and some seem to be better than others," he said. "We have a pool of varieties that are showing pretty good tolerance."

Cercospora is considered a late-season disease — symptoms typically don't appear until later growth stages.

Researchers are also working on flood- and drought-resistance projects that also tie in to better soybeans.

There is some overlap between different projects, which helps researchers crossbreed better overall varieties, Buckley said. The AgCenter has been part of a collaborative USDA breeding project that incorporates flood-resistant wild soybeans (*Glycine soja*) with cultivated soybeans (*Glycine max*) to form potentially successful new plant materials.

"When evaluating lines of plants for flood tolerance, for instance, one parent could be tolerant to flood water plus another parent with resistance to Cercospora leaf blight," Buckley said.

"Whether we have complete resistance or not, some type of improvement can be a beneficial step in the right direction," he said. "We like to see about five consistent years of plants with resistance to Cercospora in different locations in the state and regionally." **Randy LaBauve**

2017 Soybean and Grain Research and Promotion Board-funded projects

Agricultural Economics and Agribusiness $66,840

Costs and Returns from Irrigating Soybeans and Field Corn in Louisiana, *Krishna Paudel*

Economic Impacts of Groundwater Salinity in Soybean and Grain Production in Louisiana, *Krishna Paudel*

Biological and Agricultural Engineering $30,000

Nanoparticles for Improved Pesticide Delivery, *Cristina Sabliov*

Communications $4,500

2017 Louisiana Soybean and Grain Research and Promotion Board Report, *Frankie Gould*

Dean Lee Research Station $326,864

Agronomic Research to Improve Soybean Production in Louisiana, *Ron Levy and Todd Spivey*

Soybean and Grain On-Farm Demonstration Program, *Ron Levy and Todd Spivey*

Improving Soil Fertility and Agronomic Management in Louisiana Soybean Production, *Ron Levy and Todd Spivey*

Corn On-farm Demonstration Program, *Dan Fromme*

On-farm Yield Response to Fertilizer Rates in a Corn-Soybean Rotation, *Dan Fromme*

Development of UAV Technologies for Soybean and Small Grain Crops, *Randy Price*

Evaluation and Determination of Soybean Weed Management Strategies in Louisiana Soybeans, *Daniel Stephenson*

Weed Management Systems for Louisiana Feed Grain Crops, *Daniel Stephenson*

Compatibility of Cover Crops and Fall-Applied Residual Herbicides, *Daniel Stephenson*

Evaluation of Disease Resistance and Other Disease Management Practices in Louisiana Wheat Varieties, *Boyd Padgett*

Response of Corn to Variability in Stand Uniformity, *Daniel Fromme*

Entomology $100,350

Integrated Management of Changing Soybean Insect Pest Complexes, *Jeff Davis*

Best Management Practices for Sustainable Insecticide resistant Soybean Looper, *Jeff Davis*

Explore Resistant/Tolerant Varieties for Managing Sugarcane Aphid in Louisiana Sorghum, *Fangneng Huang*

Idlewild Research Station $40,700

Development of Control Options for Feral Swine in Soybean Fields, *Glen Gentry*

Macon Ridge Research Station $110,198

Refining Soybean, Corn and Grain Sorghum Insect IPM Strategies, *Sebe Brown*

Managing Diseases in Louisiana Grain Sorghum, *Trey Price*

Corn and Wheat Disease Management in Louisiana, *Trey Price*

Foliar and Soilborne Soybean Disease Management in Louisiana, *Trey Price*

Northeast Research Station $135,109

Enhanced Efficiency Nitrogen Fertilizers Under Simulated Heavy Rainfall Conditions, *Josh Copes*

Evaluating Management Decisions on Late-Season Losses in Louisiana Soybean Production, *Josh Copes*

Soybean Weed Control Research in Northeast Louisiana, *Donnie Miller*

Evaluation of the Use of Unmanned Aerial Vehicles in the Production of Soybeans, *Donnie Miller*

Evaluating Pre- and Post-Harvest Field Management Strategies in Corn, Grain Sorghum and Soybean Production Systems in Louisiana, *Josh Copes*

Plant Pathology $362,628

Using Molecular Biology to Control Soybean Diseases Cercospora Leaf Blight and Rust, *Zhi-Yuan Chen*

Cercospora Leaf Blight Disease of Soybean – Explore New Approaches for Management, *Zhi-Yuan Chen*

Identifying Sources of Inoculum to Determine Effective Management Strategies for Cercospora Leaf Blight and Purple Seed Stain, *Vinson Doyle*

Development of Foliar Treatment and Soil Amendment Methods to Promote Soybean Health, *Jong Ham*

A Study of Cultural and Fungicidal Practices to Reduce the Impact of Frogeye Leafspot and Cercospora Blight on Yield and Quality, *Clayton Hollier*

Soybean Scouting Program for Disease and Disease Resistance, *Clayton Hollier*

Management of Plant-Parasitic Nematodes in Soybean, *Charles Overstreet*

Optimization of Fungicide Usage for Management of Soybean Diseases, *Raymond Schneider*

Management of Cercospora Leaf Blight of Soybean with Foliar Applications of Iron and Other Minor Elements, *Raymond Schneider*

Survey for Soybean Green Stem Disorder and Investigations on Graft and Seed Transmission, *Rodrigo Valverde*

Fungal Infection, Transformation and Gene Silencing by a Plant Virus, *Ken Damann*

Yield Loss of Corn to Incremental Defoliation, *Clayton Hollier*

Red River Research Station $158,238

Impact of National and State Policy Changes on the Economic Outlook of Louisiana's Soybean and Corn Crop Production, *Naveen Adusumilli*

Soybean Breeding and Variety Development, *Blair Buckley*

Evaluation of Plant Response to Soil Moisture Regimes in Soybean, *Stacia Davis*

Effect of Skip-Row Furrow Irrigation on Crop Growth, Water and Nutrient-Use Efficiency in Soybean and Corn Production under Different Soil Types, *Syam Dodla*

Optimization of Nutrient-use Efficiency of Corn through Integrated Use of Organic and Inorganic N Fertilizers Under Different Irrigation Regimes, *Syam Dodla*

Management of Phosphorus and Potassium Fertilization in Soybean Under Different Irrigation Regimes, *Dodla Syam*

Evaluation of Recycled Tailwater Irrigation on Soil Nutrients, Soil Salinity Distribution and Soybean Yield in Louisiana, *Changyoon Jeong*

Renewable Natural Resources $30,000

Washout Solutions for Cleaning Spraying Equipment Used in Soybean Weed Management, *Zhijun Liu*

Rice Research Station $64,910

Evaluation of Soybean Cultural and Fertility Practices in Southwest Louisiana, *Dustin Harrell*

School of Plant, Environmental and Soil Sciences $240,300

Molecular Mapping and Expression Profiling for Development of DNA-based Markers to Complement Wheat and Soybean Breeding, *Niranjan Baiskh*

Soil Test Recommendation Comparison of Four Laboratories in the Mid-South, *Edward Bush*

Improving Management of Double-crop Soybeans, *Lisa Fultz*

Integration of Cover Crops in Louisiana Production Systems, *Lisa Fultz*

Small Grain Breeding, Variety Development and Testing, *Stephen Harrison*

Soil Fertility Research: Improving Yield and Alleviating Disease in Grain Production, *Brenda Tubaňa*

Nitrogen Budget and Management Improvement, Using Enhanced Efficiency Fertilizers for Louisiana Grain Crop Production, *Jim Wang*

Southeast Region $30,000

Soybean Production Research in Fallow Sugarcane Production Systems, *Al Orgeron*

Total **$1,700,637**

Agronomist studies effects of desiccants on soybean harvest

For some time, soybean farmers have used desiccants to eliminate late-season weeds and aid in drying soybean plants to make harvesting more efficient.

Research by an LSU AgCenter agronomist is questioning the effects of these harvest aids.

Josh Copes, a research agronomist at the AgCenter Northeast Research Station in St. Joseph, has three years of data examining three different desiccant products' effects on soybeans.

Copes is questioning whether these desiccants affect shattering or reduce soybean seed quality. The impetus for the study occurred when producers applied a desiccant that was followed by a significant rain. Many of the fields experienced widespread yield loss and greatly reduced seed quality.

"Losses can be substantial. It can range from 30 to 60 percent, which means growers are docked pretty significantly," Copes said.

The three herbicides used in the study were Sharpen, Gramoxone and sodium chlorate. In Copes' study, the beans were harvested in seven-day intervals with the first harvest seven days after the application and the last harvest 28 days after the application.

Copes found no significant reduction in seed quality or increased shattering from any of the desiccants.

A second question Copes had was whether the desiccants were actually beneficial to producers. Copes applied the desiccants and began harvesting the beans after they reached a 13 percent moisture reading. He also harvested beans at 10 days and 20 days after they reached the 13 percent threshold.

Again, Copes found no significant difference between the test plots that received a desiccant and untreated plots.

"It had me questioning the utility of desiccants, especially in northeast Louisiana," he said.

Copes said these harvest aids still will have to be applied in the southern part of the state because of pressures such as insects and disease and the prevalence of green bean syndrome.

Copes said that yield losses were not observed, and his plots did not encounter any significant seed shattering. He did have a slight reduction in some seed quality from early harvesting in some cases, and another seed quality issue was environmentally related.

"In terms of using the desiccants and their effect on quality and losses, I have not seen it," Copes said.

Copes has begun a new research project that will examine the utility of harvest aids for north and south Louisiana.

"This project may offer some insight into geographical differences that may exist between north and south Louisiana," he said. **Craig Gautreaux**

Josh Copes explains how desiccants can serve as a harvest aid on soybeans at the LSU AgCenter Northeast Research Station near St. Joseph. Copes is examining whether a harvest aid can influence soybean quality by increasing shattering of the pods. Photo by Olivia McClure

Scientist studies soybean production in fallow sugarcane systems

When thinking of production practices that go hand-in-hand, soybean and sugarcane may not be the first to come to mind. But growers in south Louisiana look for profit wherever they can find it.

LSU AgCenter weed scientist Al Orgeron is looking at ways to make the combination profitable by adjusting the planting dates of soybeans to allow for the optimal planting dates for sugarcane.

Orgeron wants to find the best planting date for beans to harvest before the optimum time to plant sugarcane, he said.

"USDA research by Dr. Ryan Viator shows that every month we have delays in planting cane beyond August, we lose about 1,000 pounds of sugar per acre," Orgeron said.

Last year, Orgeron evaluated four soybean planting dates and found the earlier the beans were planted, the better the likelihood of hitting an early August harvest while still seeing good yields.

Orgeron's team planted early-, mid-, and late-maturity Group IV beans on March 23, which averaged 60 bushels per acre when harvested August 1. That time frame fits into a normal sugarcane planting time frame, Orgeron said.

The second beans were planted on April 7 and yielded 70 bushels at an August 23 harvest. The third planting was April 19, but yields were reduced because of excessive rainfall, and harvest was delayed to the middle of September, he said. A fourth planting on May 6 rotted from excessive rainfall.

"It was a heck of a challenge to harvest soybean experiments in 2016, and the planting of sugarcane was no easier," Orgeron said.

Variety and weather conditions seem to play a role in the harvest date for the soybeans.

"What we're trying to do is gather some data on varieties to help sugarcane producers make production decisions," Orgeron said. "This information is collected throughout the growing season."

Because of the expense associated with keeping sugarcane fields fallow, including cultivating and spraying, soybeans can be used as a cover crop and potential cash crop, he said.

The idea of double-cropping soybean with sugarcane has caught on throughout the sugarcane-growing area, Orgeron said.

Soybeans are being planted on about half the fallow sugarcane fields of St. James, St. John and Ascension parishes, Orgeron said. About 20 to 25 percent of the 70,000 sugarcane acres in those parishes are fallow each year, and more than 9,000 of those acres are planted with soybeans.

While the same growers may plant soybean and sugarcane, these crops require very different herbicides, he said.

This year, eight Xtend soybean varieties, which are tolerant to the herbicides dicamba and glyphosate, were planted at the Sugarcane Research Station in St. Gabriel along with the current industry standard, Asgrow AG 4232, a variety tolerant of glyphosate but not dicamba, he said.

XtendiMax from Monsanto and Engenia from BASF are two formulations of dicamba that are labeled for use in Xtend soybean systems.

"I had a graduate student who spent two and a half hours cleaning a sugarcane sprayer tank before applying Roundup," Orgeron said. "Even after triple rinsing and using a commercial detergent, there was still enough of the dicamba left in the lines to cause damage to soybeans that were not dicamba-tolerant."

Non-dicamba-tolerant soybeans are very sensitive to dicamba. It only takes a minuscule amount — about four drops in the sprayer over an acre — to show symptoms of the herbicide, he said.

"With the results that we are generating, we are able to expand the market and help our producers add to their bottom line," Orgeron said. **Johnny Morgan**

LSU AgCenter weed scientist Al Orgeron holds a stalk of johnsongrass as he talks about ways to control the weed at the Sugar Research Station in St. Gabriel. Photo by Olivia McClure

AgCenter scientist works to develop sprayer cleanout solution

On many farms a single piece of equipment is used to spray all the chemicals needed to keep weeds, insects and diseases at bay.

This practice may be convenient, but it also can cost farmers. Many pesticides leave behind a difficult-to-remove residue, which can corrode and clog sprayers. Worse, this leftover product can harm the crops it was intended to protect.

Zhijun Liu, a researcher in the LSU AgCenter Medicinal Plants Lab, is drawing on his experience with plant-based medicinal formulas to develop a solution that effectively cleans residue from spraying equipment.

A commercial farm sprayer is complex, with plenty of places for residue to stick — not only the tank and spraying boom, but also nozzles, connectors and porous rubber hoses.

The consequences of a poor cleaning job can be devastating. Pesticide residue can cause the dosage of a subsequent application to be too strong. Or residue from a pesticide that one crop tolerates could end up on another that is sensitive to it.

Farmers are commonly advised to rinse sprayers immediately after use with either water or a water-ammonia solution. Many are put off by this time-consuming process and don't do it, Liu learned.

"Even if these instructions are followed, it does not guarantee thorough removal of pesticide residues," he said.

That's because the active ingredients in many pesticides exhibit low water solubility, meaning it's hard to wash those substances away with water. Cleaning products are commercially available, but Liu said none deliver good results.

Liu's plant-based product has shown promising results in the first year of his project. He said it cleans hoses tainted with herbicide residue better than water alone, ammonia-water solution and WipeOut, a product made by Helena Chemical.

He is now optimizing the formulation, studying how it cleans residue of 2,4-D — one of the most widely used herbicides — and trying to identify the best ways to clean spray booms. He hopes to complete lab work and begin assessing the product's effectiveness on the farm this year.

"It is a work in progress," Liu said. "It is a challenging issue, but our initial research work raises the hope that a new solution could be on the horizon for an old problem." **Olivia McClure**

A sprayer boom passes over a soybean field at the LSU AgCenter Central Research Station in Baton Rouge. Photo by Olivia McClure

As Zhijun Liu, left, a researcher in the LSU AgCenter Medicinal Plant Lab, watches, LSU weed science graduate student Matt Foster, right, pours a commercially available cleaning solution into a tank on a tractor at the LSU AgCenter Central Research Station in Baton Rouge. The solution is left in the tank overnight to remove herbicide residue. Liu is trying to develop an effective plant-based alternative. Photo by Olivia McClure

Farmers can benefit from research examining double cropping wheat and soybeans

After growing winter wheat, Louisiana farmers wishing to plant a second crop have few options. The most popular choice is soybeans, and an LSU AgCenter researcher is studying several factors that could help producers achieve higher yields or save money on their crop inputs.

Lisa Fultz, a soil microbiologist in the School of Plant, Environmental and Soil Sciences, is evaluating soybean maturity groups, examining irrigation management and determining benefits of supplemental fertilizer applications and the timing of the fertilization.

Ongoing since 2015, the project is conducted at three AgCenter sites — the Macon Ridge Research Station near Winnsboro, the Red River Research Station near Bossier City and the Dean Lee Research and Extension Center near Alexandria.

"The two main nutrients we are evaluating at are sulfur and potassium. The project is looking at both rates and timing of the potassium applications," Fultz said.

One question growers have after harvesting wheat is how to manage the wheat residue in the field after harvest. One option is to simply leave the residue and plant soybeans behind it. Many growers choose to burn the residue and then plant soybeans.

Fultz says this project could provide growers the answer of how to specifically manage this residue in regard to working with soybeans in maturity Groups IV and V.

Her findings at the Macon Ridge location found no differences in yields between soybean maturity groups in fields that were planted in residue or after burning. However, at the Dean Lee location, the Group V beans did have significantly higher yields than Group IV beans in unburned fields.

Fultz' research indicated that wheat yields also increased slightly in fields that were burned the previous year regardless of the two maturity groups planted.

The second objective focused on sulfur management in the form of urea and ammonium sulfate. The project also looked at potassium to see if the timing of the application triggered increased yields.

Urea and ammonium sulfate were applied in split treatment on wheat. The applications consisted of five different combinations. They were:

- 100 percent urea.
- 66 percent urea/33 ammonium sulfate.
- 50 percent urea/50 percent ammonium sulfate.
- 33 percent urea/66 percent ammonium sulfate.
- 100 percent ammonium sulfate.

Potassium was applied at three different times: at planting, at in-season nitrogen applications and after the wheat harvest.

The nutrient management findings indicated no significant difference in yield for soybeans or wheat. Fultz did see an increase in wheat yields with the 33 percent urea/66 percent ammonium sulfate fertilization rate, but she also reported a decrease in soybean yields with this combination.

The final objective focused on irrigation management. This research was only conducted at the LSU AgCenter Red River Research Station near Bossier City. Four treatment groups were used in the study, and they were: control (no irrigation), full-season irrigation, irrigation at the early reproductive stage and irrigation at the pod elongation stage.

Similar to the nutrient findings, there were no yield responses to the irrigation study. Fultz did point out that this was from the initial test, and differences may occur in future work **Craig Gautreaux**

Wheat and oat research focuses on better varieties

LSU AgCenter wheat researchers are using biotech tools to increase efficiency of the breeding program.

Molecular markers have been used in recent years to track genes of interest, and AgCenter researchers have added genomic selection for the first time to help develop new wheat varieties.

With genomic selection, researchers can dissect hundreds of varieties of wheat on a molecular basis into thousands of snippets of DNA, said AgCenter wheat breeder Steve Harrison.

"A computer model can process this DNA information and predict yield potential and other traits of interest prior to field testing," Harrison said.

The genomic selection project is part of the SunGrains collaborative wheat breeding program involving six Southern universities.

Harrison took 585 first-year wheat yield trial lines and used genomic selection to predict yield, test weight and resistance to fusarium head blight and stripe rust. These lines were then tested in the field at Baton Rouge and Winnsboro to evaluate effectiveness of genomic selection as an additional tool.

He said field testing is expensive and time consuming, and using genomic selection may allow lines with low genetic potential to be eliminated prior to field testing.

"We use it as a lab-based prediction method to estimate potential for untested breeding lines to supplement and enhance field testing," Harrison said. "If we can use genomic selection on a large number of lines in the step before yield testing, then we should be able to go to the field with material that has a higher probability of being a useful variety."

Harrison emphasized that the idea is not to reduce the scope of the field evaluations, but rather to go to the field with better material in the first-year yield trials.

Harrison is working with AgCenter molecular biologist Niranjan Baisakh on using bi-parental and association mapping tools to identify molecular markers linked to desirable traits in wheat varieties.

A specific trait they are looking for is tolerance to the herbicide Sencor. Baisakh has located several candidate molecular markers associated with resistance.

"The next stage is to pinpoint and validate specific markers that can be used in marker-assisted selection of herbicide-tolerant wheat lines," Baisakh said.

The researchers also are using molecular markers to become more efficient in selection and crossing.

Harrison said the molecular marker project is expanding to use the marker facility established by Adam Famoso, rice breeder at the AgCenter H. Rouse Caffey Rice Research Station.

"We anticipate being able to plant nursery trays and after 10 days collect tissue, then four weeks later have molecular data collected and interpreted to see which genes are in those lines," Harrison said.

While scientists have been working in the lab to create better wheat lines, the conditions in the field haven't been so friendly. Harrison said he was able to collect good data at his wheat nursery in Winnsboro, but adverse weather ruined much of the wheat at the nursery in Baton Rouge. Wet weather and the prevalence of diseases such as fusarium head blight negatively affected the past season's crop.

Boyd Padgett, AgCenter interim wheat specialist, said fusarium head blight, or scab, has been an issue three years in a row.

Padgett conducted variety demonstrations in five parishes: Avoyelles, Beauregard, Bossier, Franklin and Pointe Coupee. The information collected at these sites helps with variety recommendations and breeding.

Harrison also works on oats and collaborates on field and molecular work with the Southern Oats Association Panel.

"We are looking at traits such as winter hardiness, grain quality, disease resistance and human nutrition," Harrison said. **Tobie Blanchard**

LSU AgCenter wheat and oat breeder Steve Harrison reviews plots of different wheat varieties at the annual wheat and oat field day held at the Macon Ridge Research Station in Winnsboro. Photo by Olivia McClure

AgCenter scientist looks at management of corn diseases

Corn producers know well that there are many diseases that can reduce yields in their crop throughout the growing season.

With this in mind, LSU AgCenter field crops plant pathologist Trey Price is conducting trials that evaluate seed in-furrow treatments and foliar sprays on corn.

"The biggest concern we tend to have in Louisiana is foliar disease management of corn," Price said. "There are a number of foliar problems that are annual occurrences."

Price's corn disease management work is conducted at the AgCenter Northeast Research Station in St. Joseph, the Macon Ridge Research Station in Winnsboro and at the Dean Lee Research Station in Alexandria.

"The primary problem in corn fields when it comes to disease is northern corn leaf blight," he said. "We see this every year, especially where growers have corn exclusively in minimum or reduced tillage systems."

The main goal of Price's research is to look at application timing on fungicide efficacy, he said.

"What we try to do is determine the most effective products and the appropriate timings to use them," he said. "We also continue to look at the effect of fungicides in the absence of disease, since a lot of growers are under the impression that fungicides may increase yields or stalk strength. Many years of research on many hybrids at multiple locations has determined that these effects simply do not exist. Nevertheless, growers continue to apply fungicides in the absence of disease, so we must continue to mimic their practices in case something changes."

Some corn was planted as early as mid-February this year, and growers began harvesting a week or two earlier than last year's harvest, Price said.

"The reason we're having northern leaf blight problems this year can be attributed to the weather," Price said. "The pathogen prefers warm, rainy weather."

Southern rust is another corn disease that has been monitored by Price's research project. There has been light disease pressure at St. Joseph, light-to-moderate at Winnsboro, and moderate at Dean Lee, he said.

"We have trials for Southern rust and we have fungicides that are very effective," Price said. "But in Louisiana in most years, we tend to outrun the disease. In other words, the crop matures before the disease can cause yield losses. Many producers believe that a Southern rust infection during late growth stages will result in lodging. This is simply not the case. We are working to document severe Southern rust outbreaks, monitor for lodging and collect data that will help our producers make prudent management decisions."

Other evaluations in the study include rating hybrid trials, which can help producers decide which hybrid to plant. This may be particularly important in the case of northern corn leaf blight as tolerant hybrids may be available.

"However, we still work hard to provide valuable information for our growers as we can," Price said.

The findings will be released the week before Thanksgiving 2017 at the latest, he said. "We try to get the findings out as soon as we can to help growers make decisions on buying their seed," Price said. **Johnny Morgan**

Cover crop trials ongoing at several AgCenter sites

Increased consumer demand for cover crops has led LSU AgCenter researchers to study ways to improve soil health, reduce fertilizer rates, increase yield and manage moisture and remove weed pressure.

AgCenter soil microbiologist Lisa Fultz is coordinating five cover crop projects in four locations and beginning to see ecological benefits that are also economically feasible for producers.

Going into the fourth year of her cover crop trial, Fultz is comparing four nitrogen rates behind seven winter cover crop treatments at the Macon Ridge Research Station near Winnsboro to learn how producers can reduce the amount of nitrogen applications from commercial sources.

Fultz saw increases from 40 to 50 pounds per acre of ammonia nitrogen in the soil from cover crops before planting corn this spring. By increasing the difference between high and low nitrogen-rate applications this year, she hopes to get a clearer picture of how much nitrogen may be plant-available.

"If I have 40 pounds of nitrogen already from the cover crop and put out another 160 pounds, can I get 200 pounds of nitrogen out of that system? That's what we're looking at," she said.

Fultz said it takes from three to five years to start seeing additional benefits, such as potential improvements in yield, come into play.

"That's where we are now," she said. "So it will be exciting to see the results with this corn harvest."

Also at the Macon Ridge station, AgCenter research coordinator Donnie Miller has completed the second year of trials looking at four different chemistries and two application timings to determine how far in advance cover crops need to be terminated before planting.

"Tillage radish seems to take the brunt of whatever we apply," Fultz said, "so if planted in combination with another cover and without competition from the radish, the second cover may have a delayed reaction or come back, requiring a second application."

Comparing February and March termination applications, the latter showed better results from all four chemistries, hitting the covers just before flowering achieved the greatest benefit, Fultz said.

One of the big drivers for putting in cover crops is surface protection, Fultz said.

"Every time it rains, little bombs go off when raindrops hit bare ground, leading to potential issues with crusting, runoff and reduced infiltration," she said.

A study at the Red River Research Station near Bossier City is in the second year of data collection looking at soil moisture over concern that cover crops may reduce water availability for the cash crop.

Fultz said first-year data showed no significant difference on soybeans.

"We saw a lot of heavy rainfall last year so it will be interesting to see the results for this year," she said.

Another study conducted at the Dean Lee Research Station near Alexandria is looking at how cover crops impact soybean production in central Louisiana by comparing crimson clover, cereal rye and tillage radish for changes in soybean yields.

"We didn't expect to see an increase in yield the first year, but were encouraged that yields didn't decrease either," Fultz said. "It will take a few years before we can start making any recommendations."

In the southern part of the state, a study at the H. Rouse Caffey Rice Research Station near Crowley is evaluating treatments comparing five cover crops with both sprayed and unsprayed fallow plots focusing on weed control over the winter season.

First-year data showed slightly higher — but not significantly higher — soybean yields in all cover crops compared to sprayed fallow and unsprayed fallow plots with only winter weeds present, Fultz said.

A three-year study at the Northeast Research Station near St. Joseph and at Dean Lee will evaluate fall residual herbicides for controlling weeds that affect cover crops, such as glyphosate-resistant Italian ryegrass, marestail, henbit, and annual bluegrass, said AgCenter agronomist Josh Copes. The project includes two studies.

"Our main purpose is to determine if we can use herbicides in cover crops and maintain cover," Copes said. "And if we do, how much injury will we see with each herbicide?"

Looking at four common winter herbicides applied to four different cover crops, the first study will evaluate the effectiveness of the herbicides when applied two weeks after emergence.

"We want the benefits of the cover crop," Copes said. "But we are concerned with weed control first."

The first study evaluated 20 treatments using Zidua, Valor SX, Boundary and Leadoff on cereal rye, tillage radish, crimson clover and Austrian winter pea.

While first-year data are still being analyzed, Copes said he has been able to make some observations.

"Zidua two weeks after emergence looks to be fairly easy on injury and would maintain cover," Copes said.

The second part of the study looked at cereal rye and crimson clover with both Zidua and Valor SX.

Two planting dates with two herbicide application timings were scheduled to better understand how both might influence cover crop injury and weed control.

By looking at different planting and herbicide timings, Copes can observe how much injury will occur. He can also learn how much biomass will be available for improved erosion control and nutrient cycling and increased organic matter and water-holding capacity of the soil.

In fall 2016, the AgCenter received a $992,000 Conservation Innovation Grant from the USDA Natural Resource Conservation Service, largely based on the data from AgCenter cover crop research supported by the Soybean and Feed Grain Research and Promotion Board, Fultz said.

The main driver of the three-year grant is to work with producers across the state, Fultz said. The study is already underway with sugarcane and is moving forward with soybeans, cotton and corn this fall. **Karol Osborne**

Cover crops at the LSU AgCenter Macon Ridge Research Station. Photo provided by Donnie Miller

Fertilizer research examines proper rates of minerals for corn, soybean rotation

Brenda Tubaña, LSU AgCenter soil scientist, continues to work on a project to evaluate proper rates of potassium and phosphorous in combination with lime in a corn and soybean rotation.

"We want to make sure our fertilizer recommendations are correct," she said. "This study is long-term. It gives us an overview of the dynamics and fate of applied P and K fertilizer in the soil."

Tubaña said corn tends to use a large amount of phosphorous, while soybeans take up more potassium. Soil pH has to be in the 6.5 to 7 range to ensure that plants have access to balanced amounts of nutrients, she said. Soil that is too low in pH, which indicates excessive acidity, can be corrected by liming.

"The data we get from this long-term study thus far clearly show that the benefits of P and K applications are magnified if the pH is optimal," she said. "Also, with the proper pH, crops can avoid micronutrient deficiencies and toxicities."

From soil samples, lab testing determines available P and K level in the soil, and a recommendation will be made if levels are low, usually in the range of 60 to 90 pounds each.

Soil types can affect potassium recommendations, but soil type is not a consideration for phosphorous, she said.

She said stubble can be plowed back into a field after harvest to reintroduce potassium and phosphorous to the soil. **Bruce Schultz**

Fumigant shows promise in combating nematodes

A fumigant and soybean varieties resistant to nematodes may help combat the underground pest.

Charles Overstreet, LSU AgCenter nematode specialist, is in the second year of testing different treatments on a 5-acre field at the AgCenter Northeast Research Station near St. Joseph. He is testing soybeans using the seed treatment Avicta and the nematicide Telone on varieties that are resistant and susceptible to nematodes.

An identical test is being conducted on a farmer's field in Morehouse Parish with Richard Letlow, AgCenter county agent.

Overstreet said many farmers are reluctant to use resistant varieties because they have lower yields and Telone, at $60 per acre, is often too expensive.

Soil texture determines the effectiveness of Telone, he said. It works best on plants in lighter soils where the fumigant can boost yields by 20 percent. Nematodes are not as damaging to soybean roots in heavy soils, so the use of Telone in clay soils probably isn't cost effective.

To save money on Telone applications, soil data using a Veris system can be used to determine where rates can be decreased in clay soils, he said.

In the test, some soybeans treated with Telone had a 20-bushel increase, but farther into the field in heavier soil, there was an 11-bushel increase.

"We got a lot of good data last year," Overstreet said. "It's looking really promising this year as well. I would like to do it one more year to get three years of data." **Bruce Schultz**

Cultural and fertility practices evaluated in southwest Louisiana soybeans

Examining the cultural and fertility practices involved in soybean production is one focus of research conducted by LSU AgCenter agronomist and rice specialist Dustin Harrell in Crowley.

In one study, Harrell is seeking to find the optimum planting dates for soybeans in southwest Louisiana.

During planting season, Harrell's team plants soybeans in approximately two-week intervals, choosing the exact planting dates for days when the soil moisture is adequate but not excessive. They planted on March 29, April 10, April 25, May 17, May 29 and June 14.

"What we found in the date-of-planting study is the earliest-planted beans also were the first to be attacked by insects and disease," Harrell said. "In past years, we've found that planting mid-April to mid-May produced the best yields in the southwest region."

This year, Harrell decided to change the study a bit by adding insecticide and fungicide treatment to ensure that soybean yields are not limited at any of the planting dates by pests.

In addition to the date-of-planting study, he is also evaluating plant response to fertilization on soils limited in phosphorus, potassium and sulfur.

These fertility trials consist of potassium, phosphorus and sulphur rate and time-of-application trials, Harrell said.

"A date-of-planting study is also being conducted at the AgCenter Dean Lee Research Station in Alexandria," he said. "All of the varieties are the same at both locations. The difference is the southwest Louisiana soybeans are drilled on flat ground instead of on beds."

In southwest Louisiana, soybeans are normally grown in rice fields by rice producers who typically have drills and not row planters, Harrell said.

"Most growers in southwest Louisiana are not equipped to pull rows, so they use the equipment they have," he said.

This is a disadvantage for these growers, Harrell said, because soybeans grown on raised beds tend to do better than those drilled on flat ground. An old aphorism among farmers, "Soybean don't like wet feet (roots)," is often true, Harrell said. **Johnny Morgan**

Schneider and Levy leave AgCenter posts

Two longtime LSU AgCenter faculty members whose research and outreach efforts helped advance the Louisiana agriculture industry have retired.

State soybean specialist Ronnie Levy and plant pathologist Ray Schneider both took part in several projects funded by the Louisiana Soybean and Grain Research and Promotion Board.

Levy, an agronomist, who worked at the AgCenter for 38 years, spent the early years of his extension career as a 4-H agent in Calcasieu and Jefferson Davis parishes. In 1986, he became a county agent in Acadia Parish, and in 2008, he was named soybean specialist.

In his most recent role, Levy appeared on the program of countless field days and producer meetings to give updates on the state's soybean crop. He also undertook projects aimed at identifying management strategies that would help farmers boost soybean production. This included studies on planting dates, seeding rates and soil fertility.

Levy also was involved in the AgCenter on-farm demonstration program, which allows researchers to study how well crop varieties perform on Louisiana farms.

Todd Spivey replaced Levy as the state soybean specialist. Levy will remain with the AgCenter on a part-time basis as the interim director of the Louisiana Master Farmer Program.

Schneider came to the AgCenter in 1984 and had worked at other institutions before then. In 2004, he was the first to identify Asian soybean rust, which can lead to major yield losses, in Louisiana and all of North America.

Schneider's research on the destructive disease drew international attention. His work led to improved fungicide efficacy and better methods for monitoring populations of the pathogen that causes Asian soybean rust.

With help from the numerous graduate students he trained, Schneider studied soybean disease management strategies from many angles. Among his most recent Soybean Board-funded projects were optimizing fungicide usage, learning more about the genetics of the pathogen that causes Cercospora leaf blight and using foliar iron applications to suppress Cercospora. **Olivia McClure**

LSU AgCenter plant pathologist Ray Schneider examines plants in south Louisiana. Photo by Mark Claesgens

LSU AgCenter soybean specialist Ronnie Levy speaks at a field day at the Dean Lee Research and Extension Center. Photo by Olivia McClure

Unmanned aerial vehicles a new tool for scouting fields

LSU AgCenter researchers and extension agents conducting research using unmanned aerial vehicles (UAVs) are learning when to fly, what to fly and how to use this technology to increase soybean profits.

After some experience with UAVs — commonly called drones — researchers and agents have modified their technique, using the vehicles to spot-check crop conditions rather than take time-consuming photos of entire fields, said Dennis Burns, AgCenter agent in Tensas Parish.

By flying a random path 10 to 50 feet above the field, the UAV can mimic how a scout would walk through and record images that can be evaluated while still on-site.

"We can fly the UAV to scout the crop from the turnrow, so if there is a site we need to look at more closely, we can walk that part of the field and compare data while we are still at the field," Burns said.

The shift to spot checking in crop scouting allows for a smaller number of photos and some video, while whole-field images require more sophisticated computer programs and at least two to three hours to run the software.

"It goes back to time and purpose, whether it is flying 10 feet off the ground trying to get a plant stand count or flying 400 feet to monitor irrigation efficiency," Burns said.

Previously, researchers used whole-field imaging in Madison, Tensas and East Carroll parishes to detect insects, weeds and diseases and evaluate nematicide trials and irrigation efficiency.

Projects for 2017 include imaging a nematicide trial in Morehouse Parish, an irrigation efficiency site in East Carroll Parish and other northeast Louisiana soybean fields for diseases and insects.

Using the UAVs for Normalized Difference Vegetation Index (NDVI) photography allows for improved evaluation of overall plant health, said Donnie Miller, AgCenter Northeast Research Station coordinator. The NDVI photography shows reflectance differences of the plants and compares crop response.

"A normally healthy plant may reflect at one level, while one under stress will reflect at a lower level. So the UAVs are not actually going in looking for insects or weeds," he said.

NDVI photos can detect differences as early as two weeks before they can be detected with the naked eye, providing valuable information and allowing for improved decision making, which ultimately translates to increased profitability, Miller said.

"UAV technology is just another tool in the toolbox," said R.L. Frazier, AgCenter agent in Madison Parish.

The images point out the difference in crop health, but often they create more questions than answers, he said.

"The NDVI will show the stressed and non-stressed plants in the field, but you still have to put boots on the ground to find out why," Frazier said.

For whole-field imaging of a 100-acre field, Burns recommends using a plane that can stay in the air up to an hour and capture more than 600 images. For crop scouting, multi-rotor copters work better.

Cameras vary in quality and expense, he said. More expensive cameras with NDVI capability are typically used for whole-field imaging, while crop scouting can use either NDVI or RGB (red, green, blue) cameras, depending on the purpose of the image.

"Each time we fly, our image analysis improves, and the comparisons from walking the field make better sense with what we've seen in the images or, in some cases, what we didn't see in the image," Burns said.

Images taken in a Madison Parish field last year, for example, gave no indication that the field had treatable levels of the redbanded stink bugs feeding on plant pods.

"When we walked it, we found them," Burns said. "These are some of the things we are learning, and it all goes back to purpose."

Researchers plan to fly intervals once a week beginning in late July or early August on late-planted soybean fields to collect images and then walk the fields to compare data.

"There is still a place for whole-field imaging but not on a weekly basis," Burns said.

Both the 2017 nematicide and irrigation efficiency trials will utilize whole-field imaging, while the crop-scouting trial will focus on regular intervals of spot-checking and physically walking the field for comparison.

"It all ties together," Burns said.

By learning more about what type of image is needed according to crop stage and purpose, producers can make better decisions on whether to just fly a crop scout or fly a whole field image, he said. **Karol Osborne**

Louisiana Soybean & Grain Research & Promotion Board Report

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Effective sodium nitrite encapsulation could be key to managing feral hogs

A team of researchers is working to develop and deliver a prototype bait capsule designed to decrease numbers of invasive feral hogs — rapidly reproducing animals that have caused tens of millions of dollars in damage to Louisiana row crops.

Now in the third year of the project, the team is trying to effectively encapsulate sodium nitrite as part of a bait delivery system to kill feral hogs.

It takes just 8 grams of sodium nitrite to kill a 100-pound pig, Gentry said.

"The problem is when we take sodium nitrite out of a container, it pulls moisture out of the air and loses its lethal properties," said Glen Gentry, project investigator and resident coordinator of the Bob R. Jones-Idlewild Research Station. "It quickly starts turning into sodium nitrate and becomes ineffective at killing the hogs."

Scientists from the LSU AgCenter Bob R. Jones-Idlewild Research Station, the AgCenter School of Renewable Natural Resources Medicinal Plant Lab, the LSU Department of Chemistry and the University of Louisiana Monroe College of Health and Pharmaceutical Sciences are collaborating on the project, which is funded by a grant from the Louisiana Soybean and Grain Research and Promotion Board.

Prolific and destructive animals, feral hogs damage row crops and cause significant economic loss to farmers.

A 2013 LSU AgCenter survey showed hogs caused $55 million in damage to agricultural production statewide. Soybeans were the commodity hardest hit, with farmers losing $18 million.

AgCenter researchers have developed a new bait made from pogie fish. While the hogs prefer this newer bait to corn, scientists continue to work on a coating that would stabilize the potency and viability of sodium nitrite in the bait.

Any new bait technologies will need approval from the U. S. Department of Agriculture and the Environmental Protection Agency.

Researchers are also evaluating two feeders designed to release poisoned bait to feral hogs while excluding other animals.

The Hog Annihilation Machine, or H.A.M., uses visual recognition software to identify the animals as hogs and then opens a flap, releasing poisoned bait.

The Wild Pig Feeder uses exclusion bars designed to deter other animals and a weight-activated floor pan that measures for a hog's weight before allowing access to poisoned bait.

Both traps are being tested to ensure black bears cannot access the systems. **Randy LaBauve**