www.LSUAgCenter.com

Louisiana Soybean & Grain

RESEARCH AND PROMOTION BOARD REPORT

2019

CONTENTS

AgCenter scientists explore diverse strategies for soil improvement

For five years, LSU AgCenter scientists have been evaluating the effectiveness of silicon fertilization in strengthening plants against disease and other stresses that damage plant structure.

Two wheat cultivars susceptible to scab disease were planted at the LSU AgCenter Central Research Station in Baton Rouge and fertilized with three silicon-based fertilizers — wollastonite, which is a more soluble source for soil applications, and two different foliar solution sprays.

Silicon-fertilized crops showed no visible evidence of scab and, particularly with wollastonite, had bigger stalks that had less lodging than non-silicon treated plants.

"This indicates that silicon reinforces the mechanical structure of the plant," said Brenda Tubaña, a soil fertility scientist with the AgCenter. "We're recording disease ratings to see if there are any disease problems, and we're evaluating yield data."

In 2016-17 results, silicon-treated soybean plants showed a lower rating of foliar diseases and better yields than untreated soybeans.

In a different study that has been ongoing since 2004, Tubaña and her researchers found consistent long-term results that indicate a standard threshold for soil phosphorus levels (35 ppm) for corn and soybean rotations.

But even when proper amounts of phosphorus, potassium and other essential nutrients had been applied, improper pH consistently led to significant decreases in yield.

"Correcting pH of the soil is very important, and we've found that if you lime and apply only minimal units of phosphorus and potassium to soybeans, we have about a 9% to 10% average increase in yield," said Tubaña. "If you don't correct pH, you will have excessive amounts of trace minerals that can lead to toxicity and yield declines."

The LSU AgCenter started researching enhanced-efficiency nitrogen fertilizers in 2016 on wheat and, in 2017, expanded those tests to corn.

The most recent nitrogen field tests on corn and wheat were completed at the AgCenter Central Research Station. A combined fertilization of urea ammonia nitrate, a nitrification inhibitor and a urease inhibitor resulted in a 25% increase in corn yield over urease ammonia nitrate, a standard practice for most farmers.

Application of that same combination with wheat resulted in an 18% increase in yield over the standard fertilization practice, and use of only urease inhibitors resulted in a 12.9% harvest improvement.

These combinations also showed a dramatic increase in nitrogen-use efficiency when applied at certain times and rates for both corn and wheat.

"This is very important because it's a way to improve water quality and decrease greenhouse gases," said Jim Wang, a soil chemist with the LSU AgCenter. "Through several years, almost all the experiments showed that use of stabilizers has reduced loss of nitrous oxide emissions and decreased nitrate leaching."

Wang's team also analyzed the effects of micronutrients — boron, molybdenum, iron and sulfur — on soybeans at three AgCenter research stations, the Central Research Station, the Red River Research Station in Bossier City and the Dean Lee Research Station in Alexandria.

The most noticeable results were with a fertilizer combination of molybdenum and ammonium sulfate (4Mo+SN), resulting in a 20% increase in yield over standard fertilization. A foliar molybdenum spray (FoliarMo0.25) also resulted in a 20% increase.

Iron fertilization (4Fe) resulted in a 13.5% increase in yield, but boron and combinations of boron and iron resulted in yields significantly below standard fertilization yields.

continued on page 7

LSU AgCenter soil scientist Brenda Tubaña, center, works with a postdoctoral researcher and graduate students to take soil samples in a soybean field at the AgCenter Ben Hur Research Farm in Baton Rouge. Photo by Olivia McClure

From the
Louisiana Soybean and Grain Research and Promotion Board

The Louisiana Soybean and Grain Research and Promotion Board continues to steward producer-funded projects that facilitate advancement of our grain commodities. Taking this collective approach results in short term answers to growers' concerns while also creating an environment for a sustainable economic environment long into the future.

By administering Louisiana's wheat and corn checkoff and facilitating the national checkoffs for soybeans and grain sorghum in Louisiana, the board is able to administer funds for research specific to the needs of Louisiana while contributing to the larger national, or even global, market promotion. Through this collaboration, regional and national organizations share in projects that produce Louisiana specific results. Without such an approach, project efficiency would drop, extending the time it takes to answer key questions for Louisiana's soybean, corn, wheat and grain sorghum producers. To maintain national security and economic viability, research efforts right here in Louisiana are contributing to the greater strength of American agriculture.

During times of uncertainty for international trade, profit margins grow thin. Such times make improved production practices and maximizing yield potential vital to business for Louisiana grain producers. Reviewing projects, their contributions to production concerns and their roles in agronomic profitability for the Louisiana farmer remain priorities for the Louisiana Soybean and Grain Research and Promotion Board. Beyond yield potential, AgCenter scientists also look to improve production practices that guarantee high quality crops to ensure a top dollar return.

To capture the benefit of high yielding, high quality product, farmers also need the ability to access markets worldwide. Tackling infrastructure projects would be a tall task for a single state checkoff program alone. Through partnerships on a regional and national scale, producer dollars are looking at improving the delivery efficiency of Louisiana grain through projects in domestic waterways, ports and other infrastructure needs.

With this publication we strive to inform you how your dollars are being spent and the progress to which they are contributing. Through areas including soil health, water-use efficiency, disease identification and control, insect and other pest defense, and emerging technologies in many disciplines, this report describes the exciting ways your checkoff dollars are moving Louisiana producers forward.

We encourage you to make your voice heard when it comes to your needs and how to best use your checkoff dollars. Attend the next board meeting which is scheduled on Nov. 21 and 22, 2019, in Baton Rouge at the LSU AgCenter. By attending, you can hear reports on funded projects and review new proposals.

On behalf of the board, I thank you for your support of these programs, your dedication to your trade and your hard work for a better Louisiana economy. Please join us in the collective goal of a strong and sustainable Louisiana grain industry through this important program.

Sincerely,
Charles Cannatella
Chairman, Louisiana Soybean and Grain Research and Promotion Board

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

Charles J. Cannatella
Chairman
Melville
337-623-5200 home
337-207-4730 cell
charlescannatella@yahoo.com

J.K. Bordelon
Vice Chairman
Moreauville
318-985-2451 home
318-359-2222 cell
jkbfarm1238@gmail.com

Scott M. Wiggers Jr.
Secretary-Treasurer
Winnsboro
318-372-4474 cell
scottwiggersjr@gmail.com

Thomas Ater
Vidalia
601-807-1914 cell
ater201@ymail.com

Glen Brown
Lake Providence
318-559-1774 home
318-282-4727 cell
glenbrown10@gmail.com

Kim Frey
Eunice
337-580-1899 cell
frey.farms@yahoo.com

Damian Glaser
Ventress
225-625-4469 cell
dglaser@hotmail.com

Garrett Marsh
Tallulah
318-341-6087 cell
mgmarsh@yahoo.com

Dustin K. Morris
Rayville
318-366-8410 cell
doublemfarm@gmail.com

Carlos Polotzola
Melville
337-566-3754 home
337-789-7298 cell
cdpolotzola@att.net

Dan Turner
Mer Rouge
318-366-6827 cell
dturner1755@hotmail.com

Darrell J. Vandeven
St. Joseph
318-766-4963 office
318-282-5780 cell
darrellvandeven@gmail.com

Andy Brown
Executive Director
Baton Rouge
225-922-6209 office
225-480-8842 cell
andyb@lfbf.org

Precision agriculture research could change field dynamics

Precision agriculture tools could allow farmers to pinpoint crop varieties to specific locations in their fields.

Luciano Shiratsuchi, a precision agriculture specialist with the LSU AgCenter, is studying the relationship between plant and soil spatial variability and crop varieties.

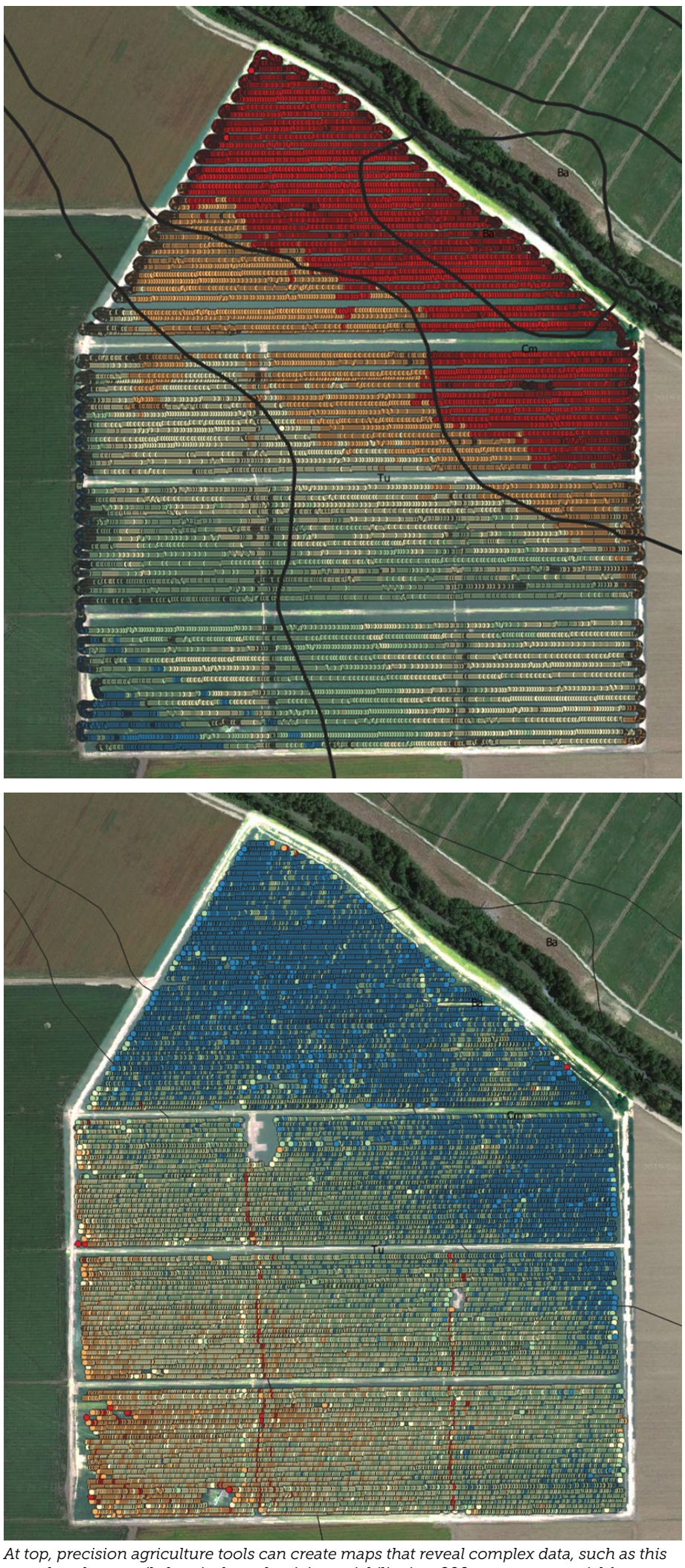
"The testing is being done on-farm using different soybean varieties and corn hybrids," he said.

Shiratsuchi said it's possible to select the variety that can perform best on different soil types found within a field. The idea is to help farmers select varieties that best perform in different zones, he said. Because different varieties are planted side by side, it is possible to have a fair comparison in a zone.

He is using electrical conductivity sensors to determine variations of soil in a field that indirectly predict soil types, texture and organic matter. The data can establish parameters for building maps to be used for variable rate seeding.

A drone or airplane with remote-sensing equipment can be used to determine nutrient demand, he said, instead of conducting more costly and time-consuming soil and leaf tissue sampling.

Drones also can help determine plant populations, which indicate seed vigor.
Bruce Schultz



At top, precision agriculture tools can create maps that reveal complex data, such as this map that shows soil electrical conductivity variability in a 200-acre commercial farm field. Bottom photo, remote sensing is used to show plant vigor differences. Photos by Luciano Shiratsuchi

Economists look at risk-management alternatives

Three AgCenter economists are examining ways Louisiana farmers can manage risk and improve their profitability.

Nauveen Adusumilli is taking an in-depth view of Natural Resources Conservation Service cost-sharing programs for conservation tillage and cover crops.

Once farmers determine their eligibility, they need to consider the best way to take advantage of cost-sharing programs, he said. A cover crop calculator can be used to measure the costs to plant, manage and terminate cover crops.

"Cost minus cost-sharing equals net cost," Adusumilli said.

Enrollment in a cost-sharing program must involve new practices that show meaningful and measurable improvements. For farmers to find out how they can use the program, Adusumilli has developed an Excel spreadsheet tool for corn and soybeans that's available on the web at http://bit.ly/covercroptool.

"It looks at the individual farming situation to develop meaningful and measurable improvement," he said. "For example, changing from planting a single cover crop species to multiple species can be eligible for cost sharing."

Cover crops require a five-year commitment, and conservation tillage requires a three-year commitment, Adusumilli said. Costs are calculated per acre. Most farmers spend $25 to $70 per acre on conservation practices, and the NRCS cost share ranges from $48 to $58 per acre. The online tool can help farmers make decisions on how to gain the most value from cost-share programs on their farms.

"The funds are intended for the farmer," Adusumilli said.

Mike Deliberto has developed enterprise budgets, net return comparison models and crop insurance tutorials farmers can use to navigate the decision-making process of selecting levels of crop insurance to procure.

"Crop insurance is a risk-management tool," Deliberto said. "We want to help farmers make better informed decisions to manage costs and inputs."

A major component of Deliberto's risk management program is developing spreadsheet-based decision tools that farmers can use to estimate their costs using U.S. Department of Agriculture national price and yield data. The agricultural risk coverage (ARC) program pays when revenue falls below an area-wide five-year average. Price loss coverage (PLC) is a price support program. Both programs have accompanying software.

The payment projector in Deliberto's program allows farmers to evaluate crop insurance costs and program payments by including cost changes in rent, fuel and other variables.

"We want to give farmers tools they can use during the year," Deliberto said. "As variables change during the season, they can make changes based on prices and yield expectations."

The tutorial provides examples of coverage levels and how farm policy works so farmers can consider and evaluate their willingness and ability to bear risk, he said.

Along those same lines, economist Lawson Connor is developing a crop insurance rating system to help farmers evaluate the relative risk of varying levels of insurance.

Farmers are concerned with high premium rates while the federal government is offering less reliance on "ad hoc" crop loss payments, he said.

Louisiana farmers have increased their yields, and risks go down as yields go up with new production methods, including pest management and irrigation. Because the system is based on actual production history and past performance over a long time, Connor is looking at a computer simulation based on more recent results rather than a 30-year history.

"We want to improve farmers' experiences with crop insurance and show them how to improve the efficient use of crop insurance," he said. "Insurance is a risk management tool rather than a cost." **Richard Bogren**

Technology makes its mark on Louisiana wheat research

The LSU AgCenter wheat and oat breeding programs are making more variety crosses and evaluating more breeding lines per year than ever before.

Improved breeding techniques, such as the use of molecular markers and genomic selection, have helped breeders work more efficiently, said LSU AgCenter wheat and oat breeder Steve Harrison.

A big focus of the program is breeding for resistance to the disease Fusarium head blight, or scab.

"The most important thing that we've done breeding wise in the last year is we've made a lot of progress on Fusarium head blight," Harrison said. "That disease has discouraged growers from planting wheat because of the damage it does and potential yield losses."

Through molecular markers they screen for FHB1, a major gene for resistance to the disease. Harrison said they rate families of breeding lines for the disease and place them in one of three categories: those that either have two copies of the resistance genes, lines that had one copy of the resistant gene and one copy of the susceptible gene, or lines that did not have the resistance gene.

"When you rank them by Fusarium-damaged kernels, it is a very clean picture," he said

Trey Price, AgCenter plant pathologist, conducts research on managing foliar diseases in wheat through fungicide efficacy trials.

"Fungicides are a tool, but resistant varieties make more sense economically," Price said. "Additionally, the best scab control you can achieve with a fungicide application is 50%. We are working towards using resistant varieties in conjunction with fungicides to manage scab in Louisiana wheat."

Price also said through his research he has determined that fungicide seed treatments do not increase wheat yields.

"We look for ways farmers can cut their input costs, and this is one that we've identified," he said.

Pathologist and wheat specialist Boyd Padgett also is working on disease management in wheat.

"Prior to breeding for resistance, we had bad scab about four out of five years in a row," Padgett said, adding that he did not see a lot of disease on wheat this year.

The breeders are working to combine the Fusarium-resistance genes with genes for high yield. Using double haploid production allows them to speed up the breeding process. Harrison said they can get a pure line in two years instead of six or eight.

Harrison said this year was a rough year for the breeding program. Severe rainstorms damaged breeding material during planting and at harvest. In years like this, he can rely on other SunGrains breeders, a consortium of Southeastern universities' wheat and oat research programs, to get good data from field trials across the region. He also said technology can help.

"With our genomic selection program, you can make up for a lot of lost field data because you have predictions that are based on thousands of molecular markers, and that has been the really big addition to the program," Harrison said.

Genomics can help with predictions for test weight, yield and disease reaction, among other traits.

Niranjan Baisakh, a molecular biologist with the AgCenter, has made significant progress in the wheat and oat breeding program using molecular markers.

"On the marker development aspect, we are focusing on narrowing the genomic regions controlling the traits of interest so we can use those genes and identify the markers linked to the genes that we can use in our breeding program for screening," Baisakh said.

With a new piece of equipment in his lab, Baisakh is screening markers for known genes on the breeding materials in house. The results of this screening will be significant in the genomic predictions of the breeding materials. In previous years they would send the materials to the LSU AgCenter H. Rouse Caffey Rice Research Station. The tests can determine which lines have the desired genes, which don't, and which are heterozygous, which means they have one copy of the desired gene.

The program didn't release any new varieties this year because of a lack of large-scale seed increases, but Harrison said there are two or three wheat lines and two or three oat lines that are being considered for release next summer. **Tobie Blanchard**

A small plot combine harvests wheat at the Macon Ridge Research Center. Photo provided by Steve Harrison

Scientists search for new ways to manage Cercospora leaf blight

LSU AgCenter researchers exploring new approaches for managing Cercospora leaf blight are learning more about what triggers toxin production, when mitigation efforts are most successful, how the fungus is spread in the field and how to speed screening for resistance in soybeans.

Sucrose triggers Cercosporin toxin production

LSU plant biology professor Zhi-Yuan Chen is studying the correlation between soybean leaf tissue sucrose levels and the production of the Cercospora toxin.

"Sucrose production might be the signal that triggers an increase in Cercosporin toxin production by the pathogen," Chen said.

LSU doctoral graduate student Maria Zivanovic is working with Chen and found that soybean leaf sucrose levels increased significantly from the R3 developmental stage to R5.

Using leaf extracts in the lab, Zivanovic discovered that the Cercospora pathogen will produce more of the toxin in the R5 extracts than in R3, and sucrose added to extracts from the R3 stage will produce as much or more of the toxin than found in R5 samples.

"Sucrose had been reported to induce toxin production in other systems, but not yet in Cercospora," Chen said.

Zivanovic also found that a foliar application of ammonium phosphate on leaf extracts at R5 will suppress the toxin production.

Early application of ammonium phosphate when sugar production in the leaves begins to increase may be a solution for managing Cercospora disease, and it has the added benefit of increasing yield, he said. However, yield estimates will not begin until the project moves to larger field production trials.

Chen is also in the third year of a study using a host-induced gene-silencing molecular fungicide to suppress Cercospora leaf blight.

Chen has isolated over 10 gene sequences that have shown efficacy in suppressing the Cercospora and soybean rust pathogens in the lab.

Iron formulation rates increased to manage Cercospora leaf blight

AgCenter field crop pathology assistant professor Sara Thomas-Sharma is looking at iron applications as an alternative to fungicides to help improve soybean resistance to the disease.

"We know that cercosporin toxin can bind to iron, and iron is known to make a plant more resistant to disease by triggering other systems within the plant," she said.

Previous work on this project by retired AgCenter plant pathologist Ray Schneider showed that an iron concentration of 300 parts per million in soybean plant leaves is needed to see any effect against the disease.

Recent work has been completed to establish baseline data for iron concentration in soybeans to show how iron content in the plant changes during growth stages.

Results showed clearly that while the lower canopy easily met the higher level of concentration, the upper canopy only reached about 100 to 200 parts per million during R3 to R5 growth stages, which correlates with the disease progression.

"In Louisiana, iron deficiency is not a problem, so what we are trying to do is push iron concentrations over what is normal for the plant to try to improve resistance," Thomas-Sharma said.

Research trials have produced variable results, in part because of changes made in commercially available iron formulations. The rate and timing of foliar and soil applications may have also played a role.

Cercospora likely not solely seed borne

Proving one line of evidence that the pathogen may not be solely seed borne, LSU assistant professor of mycology Vinson Doyle has identified seven different plant hosts in addition to soybeans for *Cercospora flagellaris*, the most prevalent species associated with foliar symptoms of the Cercospora pathogen in Louisiana.

Regardless of the dominant species found on the seed, the pathogen species prevalent on blighted leaves in Louisiana is always *Cercospora flagellaris* and remains so into the harvested seed, he said.

Doyle is hoping to confirm that the inoculum for Cercospora leaf blight can be airborne, and, if so, determine when it is moving in the field and how that information can be used to develop better management practices.

By monitoring spore traps in the field, Nelomie Galagedara, a doctoral student advised by Doyle and Thomas-Sharma, is collecting samples and developing a diagnostic test to rapidly assess the diversity on each of the samples.

"We think if we can identify when the peaks of spore production are, and when the spores are out there at the highest density, then it will be the optimum time to apply fungicides," he said.

Most of the alternative hosts are found in field margins on trees or other weed species, such as pokeweed, giant ragweed and even Venus' looking-glass. The study also looks at methods for determining how long the Cercospora pathogen will survive on debris.

Rapid lab protocol screening for Cercospora leaf blight progressing

Thomas-Sharma said work is progressing on the development of a rapid lab protocol for screening for Cercospora leaf blight resistance, which may soon supply breeders with a new tool to help reduce the number of soybean varieties to include in field trials.

By measuring the toxicity of cercosporin on smaller leaf discs in the lab, researchers are attempting to predict the disease resistance in the field, where conditions are far more complex.

More than 50% of the 25 varieties tested last year in the lab showed consistent disease ratings, Thomas-Sharma said.

Current lab testing will include 25 of the same seed varieties as those used in official variety trials conducted across the state to provide more data for each variety tested with disease ratings by field location.

"Anything we can develop to give some consistency would be a step forward," she said, adding that something is better than nothing in this scenario because there is no alternative beyond field variety trials. **Karol Osborne**

LSU graduate assistant Maria Zivanovic is exploring new approaches for managing Cercospora leaf blight. Zivanovic observed that increases in sucrose levels in soybean leaf tissue seem to trigger toxin production, while ammonium phosphate added to soybean leaf extracts at reproductive growth stage R5 suppresses toxin production. Photo by Zhi-Yuan Chen

Harvest weed seed control study expands

Harvest weed seed control techniques might sound old-fashioned, but some scientists think they could become an important part of the future of American agriculture.

These techniques, which involve preventing weeds by mulching, pulverizing or burning weed seeds during harvest, are currently being used along with other integrated weed management tactics, such as herbicides, in other countries.

Lauren Lazaro, a weed scientist with the LSU AgCenter, is studying two promising forms of harvest weed control techniques at the Dean Lee Research Station in Alexandria and the Central Research Station in Baton Rouge. She is working with other AgCenter weed scientists, including Daniel Stephenson, Josh Copes and Donnie Miller.

"The whole point is to reduce the soil seed bank," Lazaro said. "We want to impact that directly, and the goal with this technology is to not let any seeds go back into the soil at harvest."

The techniques Lazaro is researching — chaff lining and chaff tramlining — involve funneling weeds and other material off the back of the combine into narrow rows to kill weed seed that have escaped other management strategies during harvest.

In chaff lining, the chaff residue from the back of the combine is funneled into one row and left to "let Mother Nature take its course," Lazaro said. The material with the weed seed inside will mulch over and create a barrier that many seeds will not be able to penetrate.

The other technique, chaff tramlining, could possibly be more effective, Lazaro said. In tramlining, the combine funnels the chaff residue into two narrow rows on dedicated wheel tracks during harvest so that in addition to mulching, the farm equipment will run over it and compact it.

Lazaro has tested a third technique, narrow windrow burning, which involves funneling chaff and straw residue containing weed seed into rows and burning them. However, AgCenter researchers have moved away from the burning method because the smoke from burning windrows could irritate neighbors and create a hazard on highways near fields.

These weed control methods have become common in Australia, where about 80 percent of farmers use one of six harvest seed control techniques in addition to other integrated weed management tactics. Using a diverse set of methods to control weeds can help preserve current control methods, including herbicides used against herbicide-resistant weeds, Lazaro said.

Also, harvest weed seed control techniques could eventually reduce farmers' herbicide use if the soil seedbank is reduced enough. But Lazaro cautions that producers will probably see no reduction in the soil seedbank for about the first five years if only a harvest weed seed control tactic is added to current management practices.

"That's where we are seeing weed management research headed — away from herbicide use," Lazaro said. "We don't have any new herbicides coming down the pipeline any time soon as far as we know. We have to be able to preserve the ones we are using while utilizing additional integrated weed management options."

Some harvest seed control techniques are cost-prohibitive for many producers. An impact mill, such as the integrated Harrington Seed Destructor, is installed in a combine and can kill most of the weed seed gathered at harvest. These cost about $60,000, and a commercial combine requires two machines, Lazaro said.

But the chute required to funnel residue into windrows for chaff lining and chaff tramlining can be built for about $300 in materials, Lazaro said.

"It is cost-effective," Lazaro said. "Harvest weed seed control does not have to be a major overhaul on your equipment. You can do it on your own. And if that is another effective way to help control weeds, then why not use it?"

One drawback of the chaff lining and chaff tramlining methods of weed control is that these practices confine harvest chaff residue to one or two lines in the field instead of spreading the straw and chaff material all over, Lazaro said. This removes a layer of material that protects the soil, so weed scientists studying harvest weed seed control are researching them in conjunction with cover crops.

For now, these techniques are just being studied at AgCenter research stations, but soon they could move to on-farm studies.

"We're starting out with small-plot trials and, we hope, once we begin to understand the system better, we would like to move these onto grower fields. Large-scale trials and grower adoption is how we will begin to see larger effects and be able to work out any issues," Lazaro said. "Then we can see if we are seeing a larger reduction in weeds over time than compared to the systems that are being implemented currently."

While harvest weed seed control may appear primitive, Lazaro said it is working elsewhere. It could be a part of American farmers' futures.

"Be open to this type of technology," Lazaro said. "It might seem a little bit odd, but it is a viable option in your field. Give it a chance." **Kyle Peveto**

The chaff tramlining and chaff lining methods involve funneling weeds and other material off the back of the combine into narrow rows to kill weed seed that have escaped other management strategies during harvest. The chute required to funnel residue into windrows for chaff lining and chaff tramlining can be built for about $300 in materials, according to researcher Lauren Lazaro. Photo provided by Lauren Lazaro

AgCenter weed scientists delve into new weed control products

Now that soybeans with Enlist technology have been commercialized, LSU AgCenter weed scientists are able to fully evaluate the product.

AgCenter weed scientists Daniel Stephenson and Donnie Miller studied Enlist soybeans before they hit the market, but now they are expanding their research of the Enlist system, which withstands the 2,4-D herbicide that can combat glyphosate-resistant Palmer amaranth.

"Now that they are commercialized, it is allowing us to design Louisiana-specific research protocols," Stephenson said.

Stephenson, based at the Dean Lee Research Station in Alexandria, and Miller, working from the Northeast Research Station in St. Joseph, test several herbicides to find how they work with various insecticides and seed technologies that Louisiana farmers may use.

"Our primary focus is to identify any negative isses before the producer gets their hands on products," Miller said. "Because I can identify those pitfalls on a 25-foot plot rather than them put it out on thousands of acres and see a problem."

Louisiana farmers have not battled herbicide-resistant weeds to the same extent as producers in neighboring states, Stephenson said.

"The sheer number of weed species has forced our growers to be diversified in the way they manage weeds," Stephenson said. "That's why the onset of resistance has been slower than in the other states, in my opinion, the diversity of what we have been forced to do."

Louisiana does have a problem with glyphosate-resistant Palmer amaranth that continues to expand in acreage, Stephenson said. Waterhemp has also been found to be resistant to glyphosate. 2, 4-D and Xtend are technologies AgCenter researchers are studying as a potential solutions to increasing resistance problems.

Stephenson is studying Liberty Link, soybeans resistant to glyphosate and gluphosinate, which is another technology that has come online in recent years

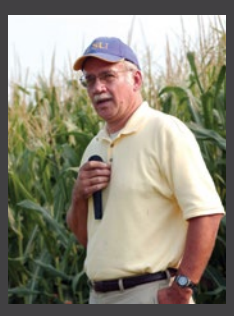
"We are trying to find ways to control weeds, whether the weed is herbicide resistant or not," Stephenson said. "Farmers need to view the dicamba and 2,4-D technologies as tools they can use, not as 'silver bullets.' A program approach must be utilized to manage weeds."

All pesticides have the potential to move off-target if applied improperly, Stephenson said.

"Unfortunately, there have been numerous cases of off-target movement of dicamba in surrounding states as well as in Louisiana," he said. "Farmers must take steps to prevent off-target movement by following the label application instructions for all pesticides, not just dicamba and 2,4-D," Stephenson said.

Louisiana has not experienced the issues with drift that have been reported in Arkansas and other states, Miller said. **Kyle Peveto**

Staffing changes



Rick Mascagni, an agronomist at the Northeast Research Station near St. Joseph, is retiring after nearly 30 years with the AgCenter. He has researched ways to improve the yields of corn, grain sorghum, wheat and oats. He also has studied fertilizer efficiency and coordinated corn and grain sorghum hybrid testing programs.

Lawson Connor, an economist, has been hired to conduct research on corn, soybean and feed grain markets; crop insurance and farm finance; and the economics of sustainable agriculture practices. He also is responsible for extension work aimed at helping farmers improve their financial performance.

Connor, who is based on the LSU Baton Rouge campus, also teaches economics courses. Prior to joining the AgCenter, he was a postdoctoral researcher at Ohio State University.

Michael Salassi has been named as LSU AgCenter associate vice president and program leader of animal and plant sciences. He will replace Rogers Leonard, who plans to retire in February 2020.

For the past four years, Salassi has served as head of the Department of Agricultural Economics and Agribusiness where he is the A. Wilbert's Sons Endowed Professor of Agricultural and Natural Resources. Prior to that time, he was on the faculty for 21 years with a teaching, research and extension appointment.

Weed scientist **Daniel Stephenson** has been named the state weed specialist for corn, cotton, grain sorghum, soybeans and wheat. In this capacity, he helps train AgCenter agents and helps clientele manage weeds.

Plant pathologist **Boyd Padgett** is serving as the interim state soybean specialist following the departure of Todd Spivey. A replacement hire is expected to be made in 2019.

Stephenson and Padgett both work at the Dean Lee Research and Extension Center near Alexandria.

2019 Soybean and Grain Research and Promotion Board-funded projects

Agricultural Economics and Agribusiness.....$95,343.67

Knowledge Transfer on Water and Soil Policy Reforms to Promote Profitable Irrigation Water Management, *Naveen Adusumilli*

Economic Analysis of Farm Programs and Commodity Costs and Returns for Soybean and Grain Production in Louisiana, *Michael Deliberto*

Evaluation of Optimal Crop Insurance Usage in Louisiana, *Lawson Connor*

Evaluation of Costs and Returns to Dicamba-Resistant Soybean Adoption and Relative Values of Corn/Soybean Seed Treatments, *Lawson Connor*

Evaluating Crop Insurance Rating Options in Louisiana, *Lawson Connor*

Biological and Agricultural Engineering.....$25,000

Fungicide Seed Treatment with Lignin Nanoparticles, *Cristina Sabliov*

Communications.....$5,000

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

Dean Lee Research Station.....$243,164

Corn On-Farm Demonstration Program, *Dan Fromme*

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

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

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

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

Evaluation of Soybean, Corn and Grain Sorghum Cultivars and Fungicides for Disease Management in Central and South Louisiana, *Boyd Padgett*

Monitoring Soybean Diseases and Pathogen Resistance in Louisiana, *Boyd Padgett*

Soybean On-Farm Demonstration Program, *Boyd Padgett*

Best Management Practices in Louisiana, *Boyd Padgett*

Entomology.....$86,500

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

IPM For Louisiana Soybean Insect Pests, *Jeff Davis*

Idlewild Research Station.....$40,000

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

Macon Ridge Research Station.....$158,230

Enhancing Field Corn Insect Pest Management Strategies for Louisiana, *Sebe Brown*

Enhancing Grain Sorghum Insect Pest Management Strategies for Louisiana, *Sebe Brown*

Enhancing Soybean Insect Pest Management Strategies for Louisiana, *Sebe Brown*

Developing Management Strategies for Corn and Wheat Diseases, *Trey Price*

Developing Management Strategies for Soybean Diseases, *Trey Price*

Managing Foliar Diseases and Head Blights of Grain Sorghum, *Trey Price*

Utilizing Nuclear Polyhedrosis Virus as Novel Insecticide in Corn and Soybeans, *Sebe Brown*

Northeast Research Station.....$240,644

Compatibility of Cover Crops and Fall-Applied Residual Herbicides, *Josh Copes (Stephenson/Miller)*

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

Investigating Cover Crop Impacts on Row Crop Production in North Louisiana, *Josh Copes*

Soybean Seed Quality as Affected by Maturity Group, Row Spacing and Harvest Aid Application, *Josh Copes*

Evaluation of Drought-Tolerant Corn Hybrids on Alluvial and Loessial Soils in Northeast Louisiana, *Rick Mascagni*

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

Plant Pathology and Crop Physiology.....$214,450

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*

Building the Framework to Develop Integrated Management Strategies for Taproot Decline, *Vinson Doyle*

Development of New Iron Formulations for Management of Cercospora Leaf Blight of Soybean, *Sara Thomas-Sharma*

Development of a Rapid Laboratory Protocol for Screening for Resistance to Cercospora Leaf Blight in Soybean, *Sara Thomas-Sharma*

Screening Grain Crops for Potential Guava Root-Knot Nematode, *Josielle Rezende and Lawrence Datnoff*

New Biological Agents for Seed Treatment and Biofertilization, *Jong Ham*

The Threat of the Guava Root-knot Nematode (*Meloidogyne Enterolobii*) to soybeans in Louisiana, *Josielle Rezende (McGawley)*

Red River Research Station.....$73,443

Soybean Breeding and Variety Development, *Blair Buckley*

Developing Optimum N, P and K Fertilization Rates for Soybeans and Corn Under No-Till Conservation Agriculture, *Syam Dodla*

Evaluating the Functional Aspects of Mixed Application of Cover Crops on Crop Productivity and Soil Health in Louisiana, *Changyoon Jeong*

Renewable Natural Resources.....$20,000

New Cleaner and Cleaning Method for Soybean Herbicides, *Zhijun Liu*

H. Rouse Caffey Rice Research Station.....$64,900

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

School of Plant, Environmental and Soil Sciences.....$241,000

Molecular Mapping and Expression Profiling for Development of DNA-Based Markers to Complement Wheat Breeding, *Niranjan Baisakh*

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

Soil Fertility Research: Improving Yield and Alleviating Disease in Soybean Production, *Brenda Tubaña*

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

The Effect of Moisture Content on Harvest Weed Seed Control in Various Cropping Systems in Louisiana, *Lauren Lazaro*

Phenological Shifts in Flowering and Seed Set Due to Selection Pressures of Harvest Weed Seed Control, *Lauren Lazaro*

Impact of Fertilization and Planting Dates on Cover Crop Biomass Production and Nutrient Turnover on Soybean-Corn Rotation Systems, *Brenda Tubaña*

Improving Micronutrient Fertilization for Soybean Production, *Jim Wang*

On-Farm Precision Agriculture Research to Support Variety Trials, *Luciano Shiratsuchi*

Southeast Region.....$36,000

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

Total Funding for 2019.....$1,543,674.67

continued from page 1

Finally, sulfur fertilization showed a significant 7.5% increase in yield on alkaline soils while exhibiting less of an effect in acidic soils. According to Wang, blending sulfur with other major nutrients might further improve yields.

Soybean plants fix nitrogen in the soil, so the common assumption was there's already enough nitrogen in the soil without fertilization. However, Wang's 2018 tests showed that an application of urea-ammonia nitrate on alkaline soils at a particular rate resulted in an 8.4% increase of harvested beans.

AgCenter researchers have also studied cover crops to find ways to keep important biomass and nutrients in the ground, making them available for plant growth.

Field experiments were done at the Red River Research Station on hairy vetch, rapeseed, ryegrass and different mixtures of these cover crops.

In laboratory incubation studies, soil with a combination of hairy vetch and winter wheat showed a significant increase in total phosphorus and potassium concentration compared to the control treatment, according to Changyoon Jeong, an LSU AgCenter agronomist.

Hairy vetch holds phosphorous well, which decreases leaching of that element, and has a relatively low carbon content in its biomass — meaning it has a relatively high nitrogen content. Winter wheat, on the other hand, contains a high carbon ratio compared to nitrogen, meaning it has a relatively low nitrogen content in the biomass.

The cover crop mixture of hairy vetch and winter wheat could have the benefit of extra nitrogen from hairy vetch to supply crop soil, while reducing nitrogen leaching due to the high carbon content of winter wheat, according to Jeong.

Conservation tillage is another potential strategy for improving soil health for crop production. The process leaves a majority of the crop residue on the soil surface and minimizes nutrient loss.

"Conservation tillage systems for crops may need different nutrient management strategies compared to conventional till," said Syam Dodla, an LSU AgCenter agronomist.

In field tests from spring 2018, Dodla found corn had higher yield in fine sandy loam when urea-ammonia nitrate liquid was injected below the soil compared to surface application of granular urea and ammonium nitrate. A split timing application of nitrogen also improved yield.

These same applications for corn in clay soil showed no yield benefits, Dodla said.

For soybeans grown in very fine sandy loam and clay soils, the application of either phosphorus or potassium increased grain yields under conservation tillage. The same applications showed no yield gain with conventional tillage.

"These first-year results showed that optimum fertilization practices for corn and soybeans under conservation tillage may be different than for conventional tillage," Dodla said. "But additional research is needed." **Randy LaBauve**

Jim Wang, a soil chemist with the LSU AgCenter, holds a handful of soil used for fertilization tests on soybeans at the LSU AgCenter Central Research Station in Baton Rouge. Analyses of the soils were used to determine the effects of micronutrients on soybean yields. Photo by Randy LaBauve

A conventional tillage field used to compare nutrient programs for different types of tillage and to develop optimum fertilization rates specific to conservation tillage. The tests were conducted in 2019 at the LSU AgCenter Red River Research Station in Bossier City. Photo by Syam Dodla

Scientists screening crop varieties for nematode resistance

LSU AgCenter plant pathologists are screening crop varieties to see if any of them have traits that deter the guava root-knot nematode, an aggressive pest that recently has become a major concern in other states.

Nematodes are microscopic worms that stunt plants' growth, make them wilt and turn yellow, and cause galls on the roots. Those symptoms interfere with water and nutrient uptake, limiting plant development and yield potential.

So far, the guava root-knot nematode has been detected in just one location in Louisiana — a sweet potato field planted with material from North Carolina, where the pest is widespread.

The nematode also has been found in South Carolina and Florida. It has been devastating to sweet potatoes, but attacks other vegetables and agronomic crops such as soybeans.

In an effort to identify sources of resistance before a potential guava nematode outbreak in Louisiana, AgCenter plant pathologist Josielle Rezende is studying how varieties of soybeans, grain sorghum, cotton, corn and sugarcane respond when exposed to these nematodes.

"This will give us a good indicator to work with in the field in case this nematode becomes a problem in soybeans," she said.

AgCenter plant pathologist Chris Clark is leading a similar effort with Louisiana sweet potato varieties.

"We are doing this research to be ahead of the problem," he said.

Their work is done within the confines of a laboratory and a greenhouse on the LSU campus to avoid introducing the pest into Louisiana soil.

"We normally wouldn't like to make recommendations on resistance based on greenhouse tests," Clark said. "We would like to have field tests too, but it's not possible."

In addition to studying varietal resistance and susceptibility, Clark and Rezende are learning more about the guava nematode biology and ecology. Much about it remains unknown. For example, it's not clear whether the aggressiveness of guava nematode populations varies by location or other factors, Clark said.

The guava nematode is similar to the Southern root-knot nematode, which is common in Louisiana, but seems to be more destructive. Rezende said sweet potato varieties that can tolerate the Southern root-knot nematode appear to be susceptible to the guava root-knot species.

Farmers can send soil samples to the AgCenter Nematode Advisory Service to determine whether their fields have a nematode infestation and, if so, which species is present. To contact the lab, call 225-578-5724.

The best way to control any type of nematode is rotating fields to nonsusceptible crops. Nematicides also are effective but field-wide applications are expensive.

"That will be a last resort for farmers," Rezende said. **Olivia McClure**

LSU AgCenter plant pathologists Josielle Rezende, left, and Chris Clark, right, stand next to equipment and plants used in their work related to the guava root-knot nematode. They are screening crops for nematode resistance. Photo by Olivia McClure

Researchers conduct hybrid and variety trials throughout the state

A great deal of time and money are spent by researchers and seed companies to develop new soybean varieties and corn hybrids.

LSU AgCenter researchers plant and study these new seeds across the state to see exactly how these new developments work for Louisiana producers.

Dan Fromme, LSU AgCenter corn specialist, conducts hybrid trials throughout the state to compare yields.

Annually, companies release new hybrids, and Fromme wants to see how well they perform in different environments on farms with different soil types, planting dates and climates.

"We try to find the top yielding varieties," he said.

Results are featured in LSU AgCenter publications, and they are posted on the AgCenter website at lsuagcenter.com/topics/crops/corn.

Extension agents in different parishes assist with the trials, and at harvest a weigh wagon is used to determine yield results. Fromme said corn planting in March and the first few days of April went well this year.

"Due to heavy and prolonged periods of rain, corn that was planted after the first week of April experienced yield reductions from the flooded field conditions," Fromme said.

Boyd Padgett, LSU AgCenter soybean specialist, is conducting core variety trials at seven locations, all LSU AgCenter Research Stations. Agronomic characteristics are evaluated, as well as yield results.

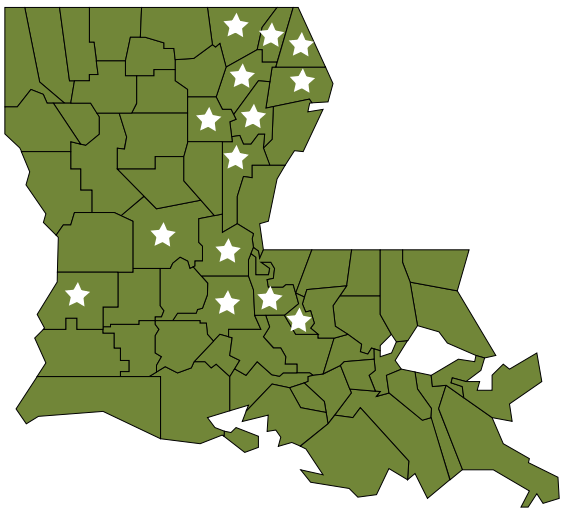
Planting started in April and ended in May with no major problems, he said.

Starting this year, he also is testing varieties at the Dean Lee Research Station in Alexandria and the Ben Hur Research Station in Baton Rouge without fungicides to determine which varieties offer the best disease resistance.

Padgett is continuing a seeding rate study to determine the minimum number of plants per acre needed for the best results. The range starts at 50,000 and goes to 175,000. He said the larger number is probably only needed on later-planted fields.

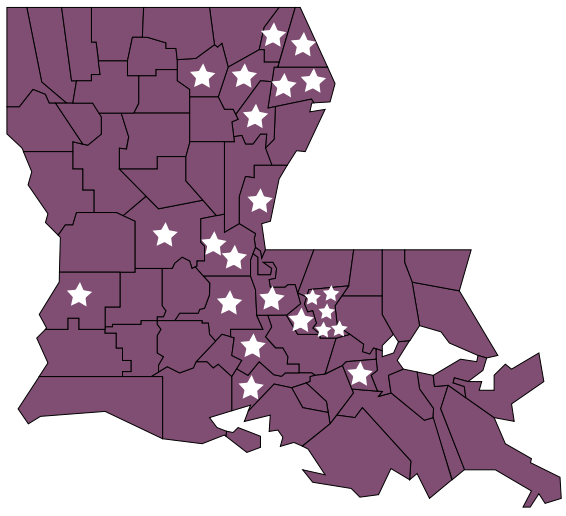
"Under normal conditions, we're finding we don't need to use high seeding rates," Padgett said.

He also is studying the rates and timing of harvest aids at the Northeast Research Station in St. Joseph and at the Dean Lee station. **Bruce Schultz**



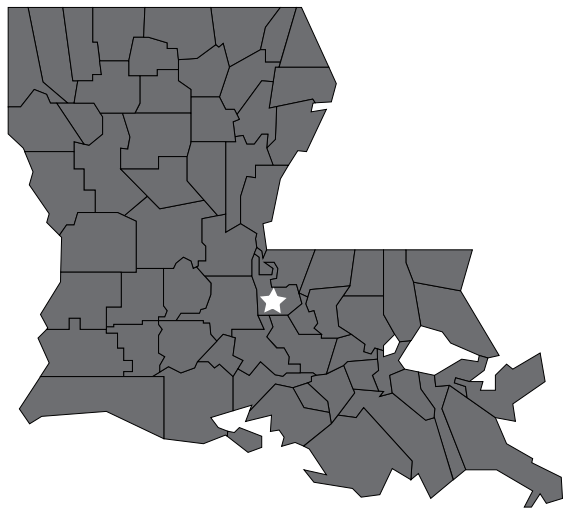
Corn core block demonstrations

West Carroll (20, Pointe Coupee, Madison, Caldwell, St. Landry, Catahoula, West Baton Rouge, Franklin, Richland, Avoyelles, Rapides, Beauregard, Morehouse



Soybean core block locations

Iberia, St. James, Martin, Richland, Franklin, Ouachita, Concordia, Pointe Coupee, West Carroll, Madison (2), East Carroll, West Baton Rouge, East Baton Rouge (5), Rapides, Avoyelles (2), Beauregard, St. Landry



Wheat core block demonstrations

Pointe Coupee

The Louisiana Soybean and Grain Research Board is a partner on the Model Farm project funded by a grant from the Patrick F. Taylor Foundation. The project is designed to study ways to decrease the amount of chemicals, such as fertilizer, used on the farm. This partnership sign is located on the model farm on the Somerset Plantation in Tensas Parish.

Advances made in feral hog bait research

For more than five years LSU AgCenter researchers have looked for ways to deliver lethal bait to feral hogs to control the population of the invasive species.

AgCenter animal scientist Glen Gentry and other researchers at the AgCenter Bob R. Jones Idlewild Research Station are working on a sodium nitrite bait that is showing promise but still needs more work, Gentry said.

Part of their research has focused on placing sodium nitrite bait in a capsule to kill feral hogs in a humane, yet lethal way because the chemical loses its potency once the air hits it.

"Sodium nitrite is known to pull moisture from the air once its container is opened," Gentry said. "Once that happens, the chemical loses its lethal properties."

Gentry and the team have found through trial and error that encapsulation is not needed because sodium nitrite retains its potency while the chemical is in a base solution.

While corn has been used as a bait, it has been determined that the pigs actually like pogie fish more, he said.

Gentry's research also shows that the pigs have corn variety preferences as well.

Corn planted at the LSU AgCenter Bob R. Jones Idlewild Research Station involves a mix of four varieties containing different combinations of Roundup Ready, Liberty Link and Bt genes and a control containing no modifications, he said.

"There are four rows of each and three replicates of the trial," he said. "We want to see if the pigs show preferences for the non-Liberty Link or different traits."

Gentry has found that the pigs will consume the control non-GMO corn before eating the other corn.

Recent studies also have looked at how the bait can be used in areas known to have bear populations, Gentry said.

The population of feral hogs in the state is continuing to grow, and Gentry said in order to hold the population at current levels, 20 percent of the population would have to be taken out. A 2013 AgCenter survey showed feral hogs are responsible for more than $55 million in damage to agricultural enterprises statewide. Of the crops listed, soybeans took the greatest hit, with farmers losing more than $18 million. **Johnny Morgan**

Corn planted at the LSU AgCenter Bob R. Jones Idlewild Research Station includes a mix of four varieties containing different combinations of Roundup Ready, Liberty Link and Bt genes and a control containing no modifications. There are four rows of each and three replicates of the trial. Researchers want to see if feral hogs show preferences for herbicide-resistant or Bt-traited corn. Photo by Johnny Morgan

Study looks at control of soybean insects

A study by an LSU AgCenter entomologist is questioning whether products sprayed to control redbanded stink bugs also kill natural enemies of soybean loopers.

Controlling loopers has become difficult because they are resistant to pyrethroids, acephate and neonicotinoids, which are sprayed to control redbanded stink bugs, said entomologist Jeff Davis. One product, bifenthrin, provided only 50% control of loopers, he said.

He said research is ongoing to find a product that will control redbanded stink bugs without affecting the looper's natural enemies.

"So far, we haven't found any," he said.

For 2019, the stink bugs were at threshold a month earlier than usual, probably because of the warm winter, he said.

Farmers may want to wait to spray for redbanded stink bugs until the pest reaches the threshold so that spraying also can be done for that pest and loopers in one application, Davis said. It is good policy to budget $15 to 20 per acre for spraying for loopers, he said.

He said treating soybeans for redbanded stink bugs at different growth stages is being studied, focusing on when female stink bugs are at their highest in order to reduce egg lay.

"Last year, we were able to reduce spraying by one application," he said.

Agronomic practices are also being studied, including the use of border crops, but those approaches could be too costly, Davis said. One approach against stink bugs has been to kill cover crops, especially crimson clover, as early as possible because that plant is the stink bug's favorite overwintering vegetation.

Research has shown that neonicotinoid seed treatments for soybeans are effective for 21 to 28 days, Davis said, and that could provide protection against early redbanded stink bugs that feed on leaves and stems.

He said two new insecticides that have been effective against redbanded stink bugs could be released as early as 2020.

Two breeding lines grown in Arkansas and Missouri demonstrated good stink bug resistance that eliminated the need for spraying insecticides.

"Hopefully, public breeders will get this germplasm into commercial varieties," Davis said. **Bruce Schultz**

Researcher working on insecticide treatments in corn, soybeans

Sebe Brown, an LSU AgCenter entomologist, has several ongoing projects to study the best ways to treat corn and soybeans against insect pests.

Brown is evaluating seed treatments for above- and below-ground insect pests at the Dean Lee Research and Extension Center in Alexandria. Neonicotinoid compounds are being reviewed for the below-ground pests including wireworms, corn rootworm and sugarcane beetle.

He said the work is showing that the most effective product is Poncho 500 and Poncho 1250, with residual activity of 18 to 21 days. He said the options are more expensive but worth the cost.

"If you're planting corn after corn, you need robust above- and below-ground pest management," he said.

Another study focuses on Bt traits. While corn earworms have become resistant to some Bt traits, a pyramid with three products is superior, he said.

"Typically, it gives it a broader spectrum and a wider range of protection against the corn earworm," he said.

The new technology uses the Vip Bt protein that is offered in corn and cotton.

"We're evaluating those products for resistance and how field corn varieties perform against resistant populations of corn earworms," he said.

Also, for soybeans, Brown is studying which neonicotinoid seed treatment is best for wireworms, bean leaf beetles and the three-cornered alfalfa hopper. **Bruce Schultz**

Agronomic practices evaluated in southeast and southwest Louisiana soybeans

Scientists researching soybean planting dates and fertility rates for southwest Louisiana are pinpointing the optimal time to plant.

The planting dates in the study are divided into six time frames beginning in late March and extending into the late spring and early summer, said LSU AgCenter agronomist and rice specialist Dustin Harrell.

While the goal is to allow two-week intervals between the plantings, the dates are actually dependent on when the soil moisture is adequate and not excessive, he said.

"What we found in the date-of-planting study is the earliest planted beans were also 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."

In addition to the date-of-planting study, Harrell is also evaluating plant response to fertilization on soils limited in the nutrients phosphorus, potassium, sulfur and zinc. These trials consist of fertilizer rate and time of application treatments, he said.

"What we're looking to find is the optimal fertilizer levels based on soil tests," Harrell said. "Unlike the planting trials, which are consistently conducted on the south farm of the Rice Research Station in Crowley, the fertility studies are being conducted on a private farm in the Iowa area to evaluate nutrient response on different soils."

In the southwest part of the state, where rice is the major crop, rice producers typically drill soybeans into flat ground instead of in beds because they have drills, 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.

These growers are at a disadvantage because soybeans grown on raised beds tend to do better than drilled beans, Harrell said.

In the southeast part of the state, AgCenter weed scientist Al Orgeron is looking at the benefits of rotating soybeans and sugarcane.

Orgeron said the main goal of the project is to help cane growers make a little extra money on fallow cane ground. With a typical cane crop, cane is on the field for five to six years, and then the ground is left fallow for about nine months, he said.

"During the months between the last cane harvest and the planting of a new crop, we try to get a crop of soybeans harvested," Orgeron said.

Another reason for the rotation is weed control, which will be a problem whether anything is planted on the land or not.

During the 1970s, some sugarcane growers were rotating soybeans with their sugarcane, but they had a major problem with grasses that couldn't be sprayed with glyphosate without killing the soybeans, Orgeron said.

Before the glyphosate-resistance gene, known as Roundup Ready, was introduced in soybeans in 1996, spraying Roundup to kill weeds would also kill the soybeans. Growers were in a no-win situation.

"The biggest weed problems we have in sugarcane are johnsongrass and bermudagrass," Orgeron said. "But this Roundup Ready technology lets us spray Roundup, which takes out these two weed problems."

Orgeron said the wet spring caused most of the cane growers to miss their opportunity to plant soybeans this year.

One of the struggles for growers is just the ability to get seed, he said. The seed companies don't release seed until March, which makes timely planting extremely difficult, Orgeron said. In St. James Parish, only three growers were able to plant beans in rotation this year — and they were only able to plant about 25% of their acreage, he said.

"The timing of harvest is very important because research shows that every month beyond August that cane is not planted reduces the yield five tons each month of delay," he said.

Another issue that sugarcane growers face is the need to inoculate the soybean seed so nitrogen fixation can occur. Soybeans obtain most of their nitrogen from the air when certain bacteria are present in the soil, and in the sugarcane-growing areas of the state there is not enough of the bacteria already in the soil, he said. **Johnny Morgan**

LSU AgCenter agent Al Orgeron checks on soybeans that are rotated with sugarcane at the AgCenter Sugar Research Station at St. Gabriel. Orgeron said he is looking for varieties that are suitable for rotation with sugarcane. The soybeans have to reach maturity in time for the grower to plant cane in mid-August. Photo by Johnny Morgan

Soybeans being studied for optimum planting dates in southwest Louisiana. Photo by Bruce Schultz

Search goes on for Cercospora leaf blight-resistant soybean

The search for a soybean variety resistant to Cercospora leaf blight (CLB) has proven to be incredibly difficult for LSU AgCenter researchers.

A major pest of soybeans, particularly in the southern U.S., it can cause significant yield loss and reduce seed quality. The seed disease purple seed stain is caused by the same pathogen responsible for CLB.

According to Blair Buckley, a plant breeder at the AgCenter Red River Research Station in Bossier City, finding a Cercospora-resistant soybean variety has been a struggle.

"It's definitely been a tough nut to crack," Buckley said.

He and others have dedicated years of research working to find resistance to CLB.

"Some lines have looked promising at some locations, but not at others," he said. "The resistance has not held up over time, which just makes it that more difficult."

That's not to say some progress hasn't been made. Researchers started looking at 500 different breeding lines and have since pared that down to 57 lines that have shown promising degrees of resistance.

Brian Ward, a postdoctoral researcher in the LSU Department of Plant Pathology and Crop Physiology, was involved in examining the lines. He helped catalogue the results from three years of studies to identify the most promising varieties.

"Continuing to look at 500 different lines was really too unwieldy. Consolidating the best lines should give us a better picture and allow us to replicate trials better for more clarity," Ward said.

According to Ward, these lines originated in the United States, Japan, China, Turkey and other countries.

Ward said that there are eight varieties of the 57 consolidated groups that seem to stand out and may help unlock the secret.

"I'm confident that we are going to find resistance in this group," he said.

One obstacle is that CLB remains somewhat of a mystery. There are multiple Cercospora species involved with the disease. Is it nutrient related? What role does the soil play? How does weather affect it? The answers to these questions could play a key role in expediting the process.

One reason for the urgency is that growers have limited effective management tools for CLB. Fungicide efficacy has significantly declined, and current fungicide strategies have offered limited success in combating the disease.

AgCenter plant pathologists Boyd Padgett and Trey Price are conducting fungicide trials to develop treatment plans to minimize the effects of CLB. A major hurdle to overcome is that strobilurin fungicides are no longer effective on the disease.

Price and Padgett are testing fungicides at five research stations and several on-farm locations. A Mud Master plot sprayer rig is allowing them to replicate tests on both large and small plots.

"Some of the newer SDHI (succinate dehydrogenase inhibitors) products have showed some success, which is encouraging," Price said.

Price indicated that what constitutes success is still somewhat limited.

"We have seen fungicide applications provide 10% to 15% yield preservation in small-plot trials, but that is not common," he said.

Price believes finding sources of resistance to CLB in old soybean varieties and incorporating those genetics into high-yielding varieties adapted to the MidSouth is going to be the key to overcoming it. There will be a place for fungicides as a management tool, but they will not be a long-term solution.

"Fungicides are a temporary solution," Price said. "As with herbicides and insecticides, Mother Nature will win over time."

One novel approach scientists are examining is looking at the role iron plays in reducing CLB. High levels of iron in leaves has been associated with less CLB. Foliar sprays of iron at the R5 growth stage have been successful in increasing the iron content in leaves, so in theory, this should help reduce CLB.

A caveat to this methodology is in parts of the northern central United States, where some varieties have been bred to be resistant to iron deficiency chlorosis (IDC), a condition common to the area. Researchers plan to test these IDC-resistant varieties to see if the varieties can accumulate more iron and become less susceptible to CLB. If they can, these varieties can be crossed with other lines and help provide resistance to CLB. **Craig Gautreaux**

This soybean variety trial at the Dean Lee Research and Extension Center near Alexandria is part of an effort by the LSU AgCenter to develop resistant soybean lines to Cercospora leaf blight (CLB). This disease is a primary pest among soybeans grown in the Midsouth, and finding resistance to CLB has been difficult. Photo provided by Trey Price

Researchers look at managing cover crops

Cover crops have become an important tool for maintaining soil health and controlling winter weeds for Louisiana farmers. AgCenter researchers are exploring ways to obtain the best results from using cover crops.

Brenda Tubaña, Jack E. and Henrietta Jones Endowed Professor in the School of Plant, Environmental and Soil Sciences, is evaluating how winter cover crops can benefit soil quality and nutrient cycling. Her regimen with soybeans includes planting a cover crop after harvest, then following with a herbicide burndown four to six weeks before planting and finally planting a cover crop after harvest.

"The cover crop returns nutrients to the soil, and more biomass returns more nutrients to the soil when the cover crop decomposes," she said.

In addition, the cover crop acts as mulch to hold down weeds, preserve soil moisture and prevent wind or water erosion.

To increase the effects of more biomass, Tubaña has added an application of 15 pounds of potash and 15 pounds of phosphate as a starter fertilizer when planting the cover crop. She has varied planting dates from immediately following the soybean harvest to as long as two months following harvest.

"Planting date has more influence on biomass," she said. "September versus November planting is like night and day," with a much better stand following earlier planting.

Tubaña uses a combination of crimson clover, hairy vetch and tillage radish as a cover crop. "We typically have grasses, legumes and crucifers in the cover crop mix," she said.

The clover and vetch add nitrogen to the soil to encourage decomposition of the cover crop following burndown and tillage radish increases sulfur levels in the soil. Tillage radish poses a problem for no-till fields because the fibrous tops poke out of the soil, so the field has to be mowed to provide a clean seedbed for planting.

At the Northeast Research Station in St. Joseph, Josh Copes, LSU AgCenter agronomist and weed scientist, is evaluating the compatibility of winter cover crops with different fall residual herbicide treatments to control annual winter weeds. The goal is to identify cover crops that tolerate residual herbicides and provide competition to winter weeds.

"We want to select the cover crop and herbicide combination to match the main crop and manage winter weeds," Copes said.

The program includes planting a cover crop of cereal rye, tillage radish, crimson clover or Austrian winter pea in combination with the herbicides Zidua, Valor, Bounty and Leadoff. The herbicide prevents growth of weeds from seeds returned to the soil within 30 days of harvest and controls plants that escape harvest. Cereal rye was the most effective as a competitor to winter weeds and was easily terminated four to six weeks prior to planting. Zidua was the least harmful residual herbicide on the cover crop and was the most effective for controlling winter weeds, particularly Italian ryegrass.

Copes applied the herbicides in October and terminated the cover crop in late January. The residual herbicides were selected to be friendly to the anticipated main crop, and the burndown herbicide was applied to allow a 30-day plant-back window prior to planting the main crop. **Richard Bogren**

Researchers develop corn and sorghum disease management strategies

Corn and grain sorghum producers in Louisiana encounter similar challenges when trying to manage foliar diseases that threaten crop yields and quality.

AgCenter plant pathologist Trey Price is conducting a series of ongoing research projects to develop management strategies, including fungicide efficacy studies.

"We are looking at which fungicides work best on different foliar diseases and what application timings are most beneficial at various stages of plant growth or if a fungicide application is needed at all," Price said.

Years of data collected on similar trials indicate that no benefit exists for applying a fungicide on sorghum in the absence of disease, he said, adding that growers frequently used this strategy in the past when commodity prices were higher as a type of insurance against disease infestation.

"We can manage many foliar diseases proactively to save input costs," he said.

In corn, northern corn leaf blight and southern rust traditionally cause the most concern among growers, while other less common pathogens, such as anthracnose, southern corn leaf blight and gray leaf spot, can be occasionally problematic.

Each year, official experimental and commercial hybrid corn trials are rated for naturally occurring diseases at multiple research stations across the state.

"Ratings from the official hybrid trials are notoriously inconsistent because the location is rotated each year, resulting in low disease pressure," Price said.

At the Macon Ridge Research Station, Price has initiated an exact duplicate of the official corn hybrid trial in a nearby field where he has grown corn for many years in a no-till cropping system. The duplicate trial is an important part of the study as it provides more favorable conditions for disease development.

"By planting corn exclusively on these plots and keeping debris levels high, the pathogens living on that debris will overwinter, improving our chances for seeing heavier disease pressure in that canopy," he said.

"We then can provide growers with a better set of disease ratings," he said.

Other corn research projects include potential threshold development for foliar diseases and novel disease discovery.

Curvularia leaf spot was recently discovered in Louisiana and will be monitored to determine if significant losses occur and if hybrids exhibit resistance.

"If previously unreported diseases start to emerge, we want to identify them and develop the integrated disease management strategies needed to help producers manage them," he said.

The same research concepts used in corn will be applied to study foliar diseases in grain sorghum.

"Grain sorghum seems to be more susceptible to foliar problems, especially in a wet year," Price said, adding that even in dry conditions, a long dew period overnight can drive foliar diseases in sorghum.

Anthracnose is the most common and destructive foliar disease in grain sorghum in Louisiana, but target leaf spot, gray leaf spot and zonate leaf spot can also be challenging.

A significant amount of the research concerning foliar diseases is aimed at developing improved recommendations to aid growers with their seasonal integrated disease management decisions.

There is limited information pertaining to hybrid susceptibility for these foliar diseases, so screening for resistance presents an excellent opportunity to provide producers with economical management options, Price said.

"Resistant hybrids cost the same as susceptible ones, and the most important decision in disease management is hybrid selection," he said

Head blights in sorghum also cause significant concern for growers, Price said, particularly in the central part of the state when rain frequently interferes with harvest season.

Fungicides are not effective on head blights; therefore, identifying hybrids that are resistant to head blights is important, he said.

Grain sorghum hybrid trials will be conducted at three AgCenter research stations — Macon Ridge in Winnsboro, Northeast in St. Joseph and Dean Lee in Alexandria.

"The greatest contribution from this research is identifying hybrid susceptibility to foliar diseases and head blights so we make accurate recommendations to growers," Price said. **Karol Osborne**

AgCenter plant pathologist Trey Price scouts for foliar diseases in official hybrid corn trials conducted at the Northeast Research Station in St. Joseph.

Louisiana Soybean & Grain Research & Promotion Board Report

Prepared by LSU AgCenter Communications, Tobie Blanchard, Director
128 Knapp Hall, Baton Rouge, LA 70803, (225) 578-2263 LSU AgCenter
Associate Vice Presidents: Rogers Leonard, Michael Salassi and Frankie Gould

Editors: Tobie Blanchard, Rick Bogren, Kyle Peveto

Writers: Tobie Blanchard, Craig Gautreaux, Randy LaBauve, Olivia McClure, Johnny Morgan, Karol Osborne, Kyle Peveto, Bruce Schultz

Designer: Ana Iverson

Photographers: Rick Bogren, Olivia McClure, Johnny Morgan, Karol Osborne and Bruce Schultz

William B. Richardson, LSU Vice President for Agriculture
Louisiana State University Agricultural Center
Louisiana Agricultural Experiment Station
Louisiana Cooperative Extension Service
LSU College of Agriculture
MISC-101 10/19
The LSU AgCenter and LSU provide equal opportunities in programs and employment.

For more information on Louisiana soybean and grain production, visit: www.LSUAgCenter.com.

PRINTED WITH SOY INK

Louisiana Soybean & Grain Research & Promotion Board
LSU AgCenter
128 Knapp Hall
Baton Rouge, LA 70803

NONPROFIT ORG
U.S. POSTAGE
PAID
BATON ROUGE, LA
PERMIT NO. 374