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Soybean & Grain
RESEARCH & PROMOTION BOARD REPORT


Research underway on cover crop effects on soil health

An LSU AgCenter research project is underway studying the use of cover crops for the potential to help farmers increase yields, improve soil health, boost soil moisture and decrease fertilizer amounts.

Lisa Fultz, LSU AgCenter soil microbiologist, said the use of some cover crops is believed to sequester soil nitrogen, then make it available when a crop is planted in the spring. "So the farmer wouldn't have to put out as much nitrogen," she said.

The study, at the Dean Lee Research and Extension Center near Alexandria and the H. Rouse Caffey Rice Research Station near Crowley, is testing crimson clover, tillage radishes and cereal rye planted on test plots after soybeans are harvested. Before planting soybeans the following year, the cover crops were sprayed with herbicide. No tillage was used.

Many of the radishes were unable to penetrate the hardpan clay soil at Dean Lee, and the roots started growing above the soil line. But weeks after being sprayed with herbicide, the radishes had died, leaving perforations in the soil that allowed moisture to enter the deeper profile of the soil, and the radishes continued to decompose.

"You can see the holes they've left," Fultz said.

Fultz took soil samples after soybeans were planted to check nutrient levels.

The study also includes the economics of cover crops. "If it costs the farmer more than they could hope to make, it's going to be hard to convince them to plant a cover crop," she said.

Her preliminary data show a yield decrease is common during the first few years when cover crops are used. Reasons are unknown for the decrease, she said, but yields improve after three to five years.

Fultz said the LSU AgCenter has applied for a grant from the Natural Resources Conservation Service to see if cover crops will serve as hosts for insect pests, and whether cover crops will increase or decrease weed pressure. The project also would include whether cover crops decrease erosion. Corn, cotton, sugarcane and soybeans would be included in the study.

Another study at the Macon Ridge Research Station near Winnsboro is using cover crops in field corn production. Cover crop treatments being used in the study include four legumes and a combination of cereal rye and tillage radishes.

Fultz said the Macon Ridge project showed a 15 percent increase in soil organic matter after the first year that the cover crops were used.

The Macon Ridge study has shown that, so far, the type of cover crop makes no difference. "No cover crop did better than another. Just having something on the soil surface is beneficial." **Bruce Schultz**

These are the decayed remains of a tillage radish and the hole in the soil where it was growing. Photo by Bruce Schultz

Lisa Fultz, LSU AgCenter soil microbiologist, takes a soil sample in a cover crop study at the Dean Lee Research and Extension Center near Alexandria. Photo by Bruce Schultz

Different strategies show promise to control feral hogs

Feral hogs continue to be a major problem in the state, and research is being conducted to reduce their numbers, said LSU AgCenter animal science researcher Glen Gentry.

Sodium nitrite, a chemical commonly used as a preservative of bacon and other processed meats, is being studied as a way to reduce the hog numbers, but it will take time to get approvals and to know proper doses to achieve the needed effect, Gentry said.

Sodium nitrite is effective in taking the oxygen out of the pig's blood through the formation of methemoglobin. The process causes them to become drowsy, lie down and expire, Gentry said. At the right dose, this will happen in most mammals, but deer and some other animals are less sensitive to the chemical.

The most recent work has been in developing an encapsulation method to maintain the potency and viability of the chemical, he said.

The problem with sodium nitrite is the pigs must eat it quickly before it loses its lethal properties.

The main procedure used in the test is to bait the pigs with shelled corn and then offer the actual toxicant, he said.

He currently has eight traps set and is using cameras and cellphone video to watch the traps in real time.

"We want people with traps to be able to pick up their cellphone, know when the pigs are feeding, and deliver the amount of bait that's needed," Gentry said.

Currently, the cameras are set to trigger the phone and show how many animals are at the trap.

The study is focusing on three needs: the effective lethal dose of sodium nitrite, an effective delivery medium, and an effective and selective delivery system.

In addition, Gentry is looking at a variety of traps that can be used in conjunction with the bait.

"With the trap we're using now – you set the camera up, and when something moves, it texts a picture to your phone," he said. "Then you send a text to the camera that will close the gate."

The goal is to use the texts to not only close the gate but also to disperse the bait so only pigs will be targeted, he said.

With annual damage estimates at nearly $1.5 billion nationally, and with a population of more than 400,000 in Louisiana, finding ways to keep the state's feral hog numbers in check is critical.

"Feral hogs are prolific in their reproductive activity, and their young tend to survive in high numbers," Gentry said.

Because of the reproductive rate of the pigs, it has been estimated that 70 percent of the existing feral pig population would have to be removed to keep pig numbers at steady levels.

Research conducted at the Bob R. Jones-Idlewild Research Station is in the process of determining the lethal dose of sodium nitrite.

Researchers have found that of the four major types of control methods, poisoning is the most effective. The study found that poisoning is 11 times cheaper than shooting and 80 times cheaper than trapping. Snares are the other control method used.

The one concern with the use of poison is fear that nontarget animals will be negatively affected. There is a need for a toxic bait but also an efficient and accurate delivery system.

"The cost of using the traps and the technology is not very expensive," Gentry said. "A low-end trap can be purchased for about $2,500."

There are various trap styles being used, and there's even the possibility of not even using traps, just having a bait station to attract the pigs.

A major problem with control is that pigs are being transported for hunting purposes to areas that currently don't have them. **Johnny Morgan**

Feral swine in a commercial-type corral trap. Photo by Glen T. Gentry Jr.

Bait prototype being developed at the LSU AgCenter. Photo by Glen T. Gentry Jr.

Amount of sodium nitrite needed to kill a 50-pound pig. Photo by Glen T. Gentry Jr.

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 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 looks to parlay the state funds with regional and national sources to make your dollars go farther to find solutions and increase production and profitability. These partnerships are particularly important as federal and state research funds become more limited.

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. 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.

The problems affecting soybean and grain producers is a moving target, especially this year with drought, excessive heat and flood stresses. Cercospera continues to be an evolving limitation to production. Pathologists are identifying ways to suppress cercosporin production to levels that allow producers to still get good yields. Dr. Trey Price, as an example, is evaluating crop hybrids and varieties for resistance to plant pathogens, as well as testing commercial and experimental fungicides and application methods. The battle continues with herbicide resistance in weeds, but two herbicide systems should be on the market soon adding to the existing methods to manage glyphosate-resistant weeds.

Louisiana feed grain producers have a new available resource funded by the board, the Louisiana Feed Grains (Corn & Sorghum) Weed, Insect and Disease Field Guide. It is available through your county agent or online at www.LSUAgCenter.com/CornandSorghumFieldGuide.

We encourage you to get involved in the checkoff programs. The next board meeting will be November 17-18, 2016, in Baton Rouge at the LSU AgCenter to hear reports on funded projects and review new proposals.

On behalf of the board, I thank you for your support of these programs.

Sincerely,

Raymond Schexnayder, Chairman
Louisiana Soybean and Grain Research and Promotion Board

Louisiana Soybean and Grain Research and Promotion Board

Soybean and Grain Research and Promotion Board members are from left to right back row: J. K. Bordelon, Ryan Kirby, Donald Berken and Leo Franchebois. Front row from left to right: Robert Thevis, Joey Olivier, Carlos Polotzola, Charles Cannatella, Raymond Schexnayder Jr. and Dan Turner. Not pictured are Darrell Vandeven and Thomas Ater. Photo by Olivia McClure

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Rotate ways to control insects in soybeans, field corn and grain sorghum

Jeff Davis, LSU AgCenter entomologist, said farmers should consider rotating other insecticides with acephate, the main product recommended for redbanded stink bugs, because of increasing acephate resistance.

He said some areas are showing acephate has lost its effectiveness completely against the pest.

Davis said he is advising farmers to avoid using acephate for several years to see if stink bugs lose resistance.

Other chemicals are available and include neonicotinoid and pyrethroid insecticides, such as Endigo ZC, Leverage 360 and Karate, he said.

But those chemicals kill beneficial insects and could cause a flare-up of soybean loopers, he said. Soybean loopers can be treated with other chemicals, such as Prevathon or Intrepid Edge, but the insect is developing resistance to those products, Davis said.

He said genetic studies will be conducted on loopers to determine if the pests originated in areas of the Caribbean where resistance to specific chemicals has developed.

Commercialization of any new insecticides has slowed in recent years, he said. But advances are being made toward improved soybean varietal resistance. "Resistance is the long-term answer," Davis said.

Julien Beuzelin, LSU AgCenter entomologist, said he is continuing his work on the relationship between soybean, weeds and insects.

"What we've seen is fairly straightforward," he said, adding that redbanded stink bug pressure is higher when weeds are managed well.

"Weeds consistently cause yield losses, while losses from insects are more variable."

Beuzelin said 2015 was the last year of his three-year threecornered alfalfa hopper study. Data have shown that the threat from this insect was overstated, he said. "We don't have to be as aggressive as we were in the past."

David Kerns, LSU AgCenter entomologist, is working on insect pests of soybeans, corn and grain sorghum. He is conducting a study to determine if Prevathon, which is used in soybeans for caterpillar control, has activity on Dectes stem-boring beetles that mine into soybean stems and petioles. The project also includes an evaluation of the pest's economic impact.

He is looking at older insecticides to see if they have any application for controlling redbanded stink bugs. "One of the problems is there are some severe plant-back restrictions on neonicotinoids in soybeans when followed by sugarcane."

He also is continuing a studying of the threecornered alfalfa hopper to measure the amount of injury caused by the insect.

"There is a great deal of confusing information regarding the impact threecornered alfalfa hoppers may have on soybean yield. Last year, we were able to measure a yield impact, but it was on beans subjected to a great deal of drought stress," he said.

In field corn, Kerns is looking at seed treatments to control soil-dwelling insects and seedling pests such as cutworms and sugarcane beetles. He said new and old insecticides are included in that study. Other corn studies involve evaluating Bt traits for efficacy toward ear-feeding caterpillars.

In grain sorghum, Kerns is evaluating materials for managing sugarcane aphids. In addition, work continues on establishing an action threshold for treatment based on a crop's growth stage and plant resistance to the sugarcane aphid.

Research on the aphid includes a study of the overwintering biology and the host range.

Work continues to identify sugarcane-aphid-resistant hybrids, Kerns said. "That's going to be the answer to economically managing sugarcane aphids in the long run."

Bruce Schultz

Jeff Davis, LSU AgCenter entomologist, checks a trap for soybean loopers at the Iberia Research Station near Jeanerette. Photo by Bruce Schultz

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

Studies aim to help farmers use soybeans as a rotational crop with sugarcane and rice

Al Orgeron, LSU AgCenter pest management specialist, and doctoral student Matt Foster have a series of studies at the Sugar Research Station near St. Gabriel aimed at helping sugarcane farmers who use soybeans as a rotational crop.

Cane farmers are eager to get their land planted to cane by late summer, so they want to get their fallow season of beans harvested as soon as possible, Orgeron said. "Typically, cane farmers plant earlier so they can plant cane in August."

He said some farmers have had difficulty harvesting good yields with early planting of late-Group III and Group IV beans.

In their study, Foster and Orgeron planted Maturity Group 4.2 through 4.8 soybeans in four different plantings, starting on March 23, followed by April 6, April 19 and May 6. By mid-May, the earliest planted beans were in the R-2 stage, and plants in the second planting date had reached R-1.

"We're just trying to push that planting window and not compromise yield," Orgeron said.

The targeted harvest is the first week of August.

The test plots were planted in twin rows, 18 inches apart into a stale cane bed at the rate of 120,000 seedlings per acre, with 100,000 per acre actually emerging.

By planting earlier, the crop is more likely to develop ahead of the hottest weather during most years, Orgeron said. Also, a soybean crop that develops a full canopy earlier provides less sunlight for weed growth, he said.

Seed treatments tested

In another project, nine combinations of fungicide and insecticide seed treatments are being tested to determine if the extra expense can be justified through increased yields.

They also have a test evaluating no-till beans into the last stubble of a sugarcane crop, using different herbicides to control weeds.

"Purple nutsedge is becoming a bigger problem for cane growers," Orgeron said. "Glyphosate alone is not taking it out."

Orgeron said the study is evaluating Authority XL, Spartan and Permit Plus as potential pre-emerge treatments in combination with glyphosate.

Orgeron said another study is looking at the use of the product Bio-Forage ST as a seed treatment that could help soybeans better manage stresses such as drought.

Southwest Louisiana soybeans

Research is being done for southwest Louisiana soybean farmers by Dustin Harrell, LSU AgCenter agronomist. He said his soybean work includes a date-of-planting study at the South Farm of the H. Rouse Caffey Rice Research Station. Planting was done on six different days starting April 4, with the last on June 20. Because of weather conditions, no March planting could be done, Harrell said. But overall weather conditions have been much better than the 2015 growing season.

Near Mamou, a nutrient study is testing different rates of potassium, phosphorus and zinc, and an application test is being done for potassium and phosphorus at different growth stages, starting at planting and continuing through R-6 (full pod).

"We should have some good data coming out of this project," Harrell said.

Bruce Schultz

Matt Foster, doctoral student, left, and Al Orgeron, LSU AgCenter pest management specialist, inspect soybeans at the Sugar Research Station near St. Gabriel. Photo by Bruce Schultz

Researchers step up efforts to combat sugarcane aphids

Researchers from the LSU AgCenter are stepping up efforts to combat the sugarcane aphid, the chief pest for grain sorghum crops. Sugarcane aphids suddenly began colonizing grain sorghum in 2013 — a behavior that quickly spread to all parishes and caused catastrophic crop losses in 2014.

"Most importantly, we're hoping to identify some high-yielding sorghum hybrids that have some resistance to the sugarcane aphid," said David Kerns, LSU AgCenter entomologist at the Macon Ridge Research Station in Winnsboro. "We're also looking to improve scouting protocols for aphids and better spraying strategies to minimize their damage."

Researchers are growing hybrid grain sorghum test plots at the Macon Ridge Research Station, the Northeast Research Station in St. Joseph and the Dean Lee Research and Extension Center in Alexandria. These are split plots, where half is controlled with insecticides and the other half is not sprayed, allowing aphids to produce maximum levels of plant injury.

"There are some sorghum hybrids out there that look pretty good," Kerns said. "We're looking for ones that at least offer us some resistance, so either they can tolerate more aphids, or populations develop slower."

"Whenever we harvest, we compare yields of both those hybrids to see how they perform over the season," said John David Gonzales, a research associate and LSU graduate student who is working on the sorghum hybrid study, which is primarily funded by a grant from the Louisiana Soybean and Grain Research and Promotion Board.

Researchers also take these hybrids into the lab, where they grow them and infest them with high numbers of aphids to serve as an additional index of susceptibility.

"He (Gonzales) will take a single aphid from the time it's born and monitor the aphid's entire life on that plant. He'll count all of its offspring, monitor its feeding habits and determine how long the aphid lives," Kerns said.

This information will be used to determine how the plant affects the aphid population growth. It's a way to measure the plant's resistance to aphids, Kerns said.

Using pyrethroid insecticides to control other sorghum pests can cause sugarcane aphids to proliferate, Kerns said. Sorghum midge is a tiny fly that is difficult to scout, so some growers may mistakenly spray pyrethroids for midge, even if the insects are not present in their fields.

"If we spray these pyrethroids on other pests, it kills the aphid's natural enemies, and sugarcane aphid populations really take off because they're unimpeded by anything that's going to suppress them," Kerns said. "We're trying to offer education on how to scout for midge, what to look for, and to identify some alternative insecticides so producers don't have to use pyrethroids," he said.

The LSU AgCenter is also continuing collaborative efforts with Texas A&M AgriLife to develop an integrated pest management strategy for grain sorghum. Most recently, the collaborators established a preliminary action threshold at the boot to milk plant stage of 50 aphids per leaf, with colonization of 20 percent of the plants in the field before spraying insecticides.

"Maybe we can come up with a more efficient way of scouting these aphids that is faster and more accurate," Gonzales said.

The reason sugarcane aphids suddenly shifted from sugarcane crops to grain sorghum is still unknown.

LSU AgCenter researchers hope to answer that question by focusing on the biology and life cycle of sugarcane aphids.

Graduate student Greg Wilson is bringing in different wild grasses and seeing how the aphids respond to these grasses and if any of these could serve as reservoirs for aphid populations, particularly in overwintering situations, Kerns said.

In Louisiana, 100 percent of the sugarcane aphid population has been found to be female and to reproduce asexually, giving birth to nymphs that are essentially born pregnant. These nymphs mature into reproducing adults within five or six days and may produce 30 to 40 offspring over a 20-day period.

LSU AgCenter researchers are using growth chambers to mimic the conditions in countries that share a common latitude with Louisiana — Japan, India and Africa. "Only host plants that have been identified as very reliable are being used," Wilson said.

Randy LaBauve

John David Gonzales, an LSU AgCenter research associate, scouts and evaluates young commercial sorghum hybrids for resistance to the sugarcane aphid at the Macon Ridge Research Station in Winnsboro. Photo by Randy LaBauve

Sugarcane aphids. Photo courtesy of Pat Porter, Texas A&M AgriLife Extension

Drones find their place on the farm

For several years drones – or unmanned aerial systems or vehicles – have been popular with hobbyists. But they are now making their presence known in the agriculture industry.

LSU AgCenter researchers and extension agents are looking at ways to use the technology to help farmers increase yields while decreasing their expenses.

"We're using drones with an attached camera to detect weak spots in a field, whether it be flooded areas or areas with plant disease pressure," said Dennis Burns, extension agent in Tensas Parish.

In soybean fields he is able to detect nematode damaged plants or the failure of irrigation practices.

"If you see an area in a soybean field with dead spots and suspect nematodes, then we can go into that field and pull a soil sample and verify the problem," he said.

Some things farmers see from the drone's cameras may not be things that can be fixed this season, he said. But the information prepares them for adjustments that may need to be made for next year's crop.

Burns said the drones are fitted with Normalized Difference Vegetation Index (NDVI) technology, which can provide a measure of plant health.

"The greener the plant is, the healthier it is," Burns said. "NDVI can be used to examine uses for nitrogen fertility, to spot problems in fields and to measure irrigation efficiency."

The photo is made by collecting an image that has a red color band and the near-infrared color band. The readings of these two bands are used in a formula to calculate NDVI, he said.

"Farmers are gradually getting into the use of drones" Burns said. "Some of the crop consultants are also seeing the value. But we are still in the learning process."

With the recent flooding in north Louisiana, some growers were able to use their drones to give the insurance companies a bird's eye view of the damage. **Johnny Morgan**

This Pacesetter UAV captures the Normalized Difference Vegetation Index (NDVI), a measure of plant health. Photo by Dennis Burns

LSU AgCenter agent Dennis Burns in Tensas Parish uses his drone to provide information for farmers to make better crop management decisions. Photo by R.L. Frazier

Scientists look for efficiency with skip-row furrow irrigation

The most common way that farmers irrigate their crops in Louisiana is furrow irrigation — pumping water into the field to flood rows. While its cost is low, furrow irrigation is also inefficient, with much of the water running off the field.

But if farmers skip rows when irrigating, this may improve efficiency and still give crops enough water and nutrients, according to Syam Dodla, an agronomist at the LSU AgCenter Red River Research Station.

"Due to agriculture being the major consumer of freshwater and the long-term perspective of a shortage of freshwater resources, there is an urgent need to develop new strategies to conserve water," Dodla said. "Furrow irrigation is still a dominant type of irrigation due to its low cost, but the water use efficiency is as low as 40 percent."

The effectiveness of skip-row irrigation depends on a number of factors, including soil and crop type, which can affect how water flows down the field, he said. Heavy clay soils, for example, have better lateral seepage than lighter sandy soils.

Ryan Kirby, who farms corn, cotton and soybeans in Belcher in Caddo Parish, said many farmers have been using skip-row irrigation on clay soils. The heavy texture of the clay holds water well, while more water is required to spread through sandy soils that drain faster.

Most farmers have 38- or 40-inch rows, but Kirby now uses 30-inch rows and skip-row irrigation for crops grown in both clay and sandy soils.

More research is needed to determine if skip-row irrigation affects crop yields and if farmers can afford to cut back on the amount of water they use, said Kirby, a member of the Soybean and Grain Research and Promotion Board. But one benefit of skipping rows is that farmers have only half as many holes to punch in poly pipe, which saves time and labor, Kirby said.

"The objectives of this research are to evaluate and quantify the effect of soil texture on water use efficiency and crop yield with skip-row irrigation as compared to regular furrow irrigation," Dodla said. He is also studying how irrigation frequency and amount should be adjusted when skipping rows, and how the practice may affect soil health and plant nutrient uptake.

Dodla, who began the study in 2015, so far has found that skip-row irrigation doesn't seem to cause a significant decrease in corn yield in either light- or heavy-textured soils. But skipping rows with irrigation did cause a significant soybean yield drop in a field with very fine sandy loam, he said.

Syam Dodla, LSU AgCenter agronomist, is studying the effectiveness of skip-row furrow irrigation. Photo by Tammi Arender

"Part of the differences in the results of soybeans and corn could be due to differences in the growing season — amount and distribution of rainfall and average temperature — rather than crop type," he said.
Olivia McClure and Tammi Arender

Researchers seek to suppress Cercospora leaf blight

Cercospora leaf blight has posed major problems for Louisiana soybean producers for the past several years. The disease, which is caused by a fungal pathogen called C. kikuchii, is nearly impossible to control, with no good fungicide options available and unsatisfactory levels of disease resistance.

But Ray Schneider, an LSU AgCenter plant pathologist, has been working to identify ways to at least suppress cercosporin production to levels that allow producers to still get good yields. Cercosporin is the toxin produced by C. kikuchii.

Eduardo Chagas Silva, a graduate student working under LSU AgCenter plant pathologist Ray Schneider, holds a soybean leaf in a solution used to expose the plant to cercosporin, the toxin associated with Cercospora leaf blight. Photo by Olivia McClure

He has been studying how applying iron to the leaves of soybean plants can suppress Cercospora, which causes leaves to become dessicated and fall off during the critical R5 pod-filling stage of growth, resulting in yield losses.

When iron is present, production of the toxin as well as blight symptoms are suppressed, Schneider said. The toxin causes oxidative stress that can damage leaves, and iron seems to help plants better cope with the stress, he said.

Two of Schneider's students, Brian Ward and Eduardo Chagas Silva, are studying how iron and the cercosporin toxin interact to affect soybean plant health.

Cercospora can cause massive, sudden defoliation of soybean plants. The fungus is an endophyte, meaning a plant may not show any symptoms for up to 90 days after being infected, Schneider said.

"The leaves may turn purple, or you may see some subtle signs of blight. But very quickly thereafter, the entire canopy becomes blighted and defoliate, which results in significant yield loss," he said.

That is perhaps one reason why fungicides generally are not effective in controlling Cercospora leaf blight, he said.

Cercospora seems to be associated with green stem, a disorder that prevents the stems of plants from maturing, which makes them pliable and causes them to get tangled in harvesting equipment, Schneider said. It's not clear, however, what causes green stem or how it's connected to Cercospora leaf blight.

Schneider is also working with Zhijun Liu, a professor in the School of Renewable Natural Resources who studies medicinal plants, to find a way to solubilize cercosporin so that the solution can be used to screen varieties and breeding material for disease resistance.

By eliminating the pathogen and exposing the plants only to the toxin that causes symptoms, researchers can better assess resistance, Schneider said. The toxin is not water soluble, however, making it difficult to actually get it into the plant.

Liu has developed a proprietary compound that solubilizes cercosporin in water so it can enter plant tissue. In tests, soybean leaves with petioles are placed in culture tubes containing a bright red solution made from cercosporin and Liu's compound. The leaves absorb the toxin and usually exhibit symptoms of Cercospora leaf blight within two days.

"We're now able to reproduce symptoms of the disease, and that's a major accomplishment for several reasons," Schneider said. "We have a reproducible way to induce these disease symptoms in soybean leaves under controlled conditions. We're still working to optimize important factors — what concentration of toxin to use, what light intensity to use — so that when we finally develop this protocol, others, especially breeders, can use it to screen for disease resistance." **Olivia McClure**

LSU AgCenter wheat breeding program improves genetics

Staying ahead of diseases and guarding against herbicides are two projects in the LSU AgCenter wheat program.

Wheat breeder Steve Harrison is trying to improve wheat resistance to diseases such as stripe rust, bacterial streak and Fusarium head blight, which is commonly referred to as scab.

Harrison's program released the variety AGS 3000 in 2015, and Harrison said it produced good yield results in this year's trials.

"In a harvested test comparing varieties, AGS 3000 was in the top two or three for yield and had high test weight and low scab issues," Harrison said.

Harrison is working with molecular biologist Niranjan Baisakh to use molecular markers — small fragments of DNA — to identify desirable genes in potential wheat varieties that would offer resistance to diseases and herbicides.

Baisakh said some varieties of wheat tolerate the nonselective herbicide Sencor, but other varieties don't, and those plants can be killed along with weeds.

Baisakh uses a genetic mapping strategy to identify specific regions of the chromosome that control resistance to Sencor. From there, he can identify genes and linked DNA markers associated with resistance to Sencor.

Baisakh used the same method to identify genes for stripe rust resistance in the Louisiana wheat variety LA841.

"We found three regions in two chromosomes that control wheat stripe rust resistance," Baisakh said, adding that the three markers work together. "When markers are present together, that is a positive indicator for resistance."

In the field, plant pathologists Boyd Padgett and Trey Price evaluate variety trials in multiple locations across the state to determine how wheat varieties stand up to diseases. They also evaluate the effectiveness of fungicides on wheat disease management.

Padgett said some varieties exhibit good resistance to some diseases, so fungicide applications may not be necessary.

"You don't take antibiotics when you are not sick," Padgett said. "Using a fungicide only when necessary increases the fungicide's longevity and promotes fungicide stewardship."

Harrison said this past year was a good year for his program with some milestones, but he said it was frustrating in terms of breeding material.

"We lost a lot of material when the Mississippi River came up and saturated the soil at primary test sites," he said.

The AgCenter's wheat and oat breeding program is a member of SunGrains, a consortium of Southern universities' wheat breeding programs.

"One good thing about SunGrains is that if one of us loses material, you can ask someone in another state to save seed of their material, so we help each other out," Harrison said. **Tobie Blanchard**

Aflatoxin research includes transgenic corn seed

LSU AgCenter scientists are continuing their research on aflatoxin and *Aspergillus flavus*, the fungus that produces it.

Zhi-Yuan Chen, AgCenter plant pathologist, is in the second year of identifying a genetic change that could impart resistance to *Aspergillus flavus* in corn.

In a process that's already been used in wheat and tobacco, Chen collaborated with scientists at Iowa State University and inserted genes from *Aspergillus flavus* into an inbred corn line. The genetic material from the pathogen was inserted into the corn in such a way that the plant sees it as an invasive organism and triggers a defense response to generate plant resistance, Chen said.

Last year, Chen received a handful of transgenic seeds that contained a section of DNA from *Aspergillus flavus*. The challenge is to create plants that contain the gene in every plant in every generation.

To address this, Chen's team has been increasing these seeds in a research plot over the past two seasons. This process involves growing the seeds into whole plants and making sure each plant is fertilized by its own pollen through manual hand pollination.

It's important that the seeds are grown in isolation to comply with USDA Animal and Plant Health Inspection Service regulations, Chen said. To prevent any pollen from reaching other corn plants, the research plots are at the Botanic Gardens at Burden in Baton Rouge, far away from any corn field.

Although the gene is not in every seed in the first generation, the process of self-pollination can create homozygous plants over the course of several generations.

If the transgenic seeds have the genes, they will be less susceptible to fungal infection and aflatoxin production. Chen's team is collecting seeds from the field and testing seeds from each of 600 plants to determine which contain the gene of interest.

Those seeds will then be used to produce new plants that can be used in future corn breeding programs.

The project is supported by the Aflatoxin Mitigation Center of Excellence administered by the National Corn Growers Association with funds contributed by state field corn commodity boards acros the Southeast. **Rick Bogren**

Yenjit Raruang, a graduate student working with Zhi-Yuan Chen, plant pathologist, bags corn tassles for collecting pollen to be used the next day for hand pollination to increase the seeds of the transgenic corn plants that have the potential to suppress Aspergillus flavus infection and reduce aflatoxin contamination. Photo by Zhi-Yuan Chen

Louisiana farmers will have to pay two new taxes

Louisiana farmers will have to pay two new taxes put in place by the state Legislature in an effort to fill a budget shortfall.

One measure imposed a 5-percent tax on poly pipe, which previously was not taxed, for the 2015-2016 fiscal year, which ended June 30. The rate decreased to 3 percent on July 1, the first day of the new fiscal year, and will remain at that level until June 2018.

The other new tax is a 1-percent tax on the sale of off-road diesel fuel, which was tax-exempt in the past. It also is in effect through June 2018.

These new expenses could hurt some farmers, who are already struggling to stay afloat amid rising input costs and unfavorable commodity prices, said Naveen Adusumilli, an LSU AgCenter economist.

"When all these variables act at one time, those costs increase quite a bit," he said.

The taxes were passed in the first of two special sessions held this year in addition to the regular legislative session. Legislators have agreed to revisit the taxes later and consider reducing the rates, Adusumilli said.

In the meantime, producers of water-intensive crops such as corn and soybeans will face steeper irrigation costs. The poly pipe tax alone will increase production costs by about 50 cents per acre, Adusumilli said.

About 1.1 million acres of cropland is irrigated in Louisiana, he said. The vast majority of Louisiana farmers who irrigate — 80 percent — use poly pipe.

The impact of the new off-road diesel tax is not yet clear.

Together, the two taxes could decrease overall net returns for soybean and corn production, Adusumilli said. Those commodities contribute significantly to the state's gross domestic product, he said, so raising the cost to grow those crops could harm the state's economy.

It's also possible that some of the money the state intended to raise with the poly pipe tax will never be collected. Some farmers live close to borders with neighboring states, where they can buy poly pipe without being taxed, Adusumilli said.

"The unintended consequence is that not all the money is coming to the state," he said. "It's going somewhere else."

Adusumilli is studying what kind of impact the taxes may have in a market already dealing with high production costs and poor commodity prices.

"Any slight increases in the taxes will affect what farmers make," he said. **Olivia McClure**

Farmers need accuracy, consistency in soil tests

Finding the true nutrient deficiencies in soil can only be found with a test, but are all soil tests created equal? That is the question LSU AgCenter scientists hope to answer.

Without a benchmark, it is impossible to say that one soil test is any more accurate than another. But work being done by AgCenter horticulturist Ed Bush will determine how to standardize the process.

"What we're doing is looking at the consistency of soil testing labs across the country," Bush said. "We want to determine consistency of results from 10 farms processed at different labs."

A soil test can determine the fertility of the soil or the expected growth potential, which could indicate nutrient deficiencies and potential toxicities from excessive fertility.

It's not so much about the results, it's more about the recommendations of the labs, Bush said.

Producers only want to apply nutrients as needed, and this study will help them use only the amount of nutrients necessary to produce their crop.

"The important thing about this is that we can make use of GPS to add nutrients only where they are needed, making fertilizer applications more efficient," Bush said.

A good soil sample must be representative of the entire area that a grower is planning to use.

"I don't think people realize how much science is involved in soil testing and recommendations to apply fertilizers," Bush said. **Johnny Morgan**

Nanoparticles may improve insecticide delivery to soybean plants

An ongoing study testing the use of nanoparticles to deliver insecticides is producing positive results. Cristina Sabliov, a scientist in the LSU AgCenter Department of Biological and Agricultural Engineering, and Jeff Davis, an LSU AgCenter entomologist, have shown that insecticides embedded in nanoparticles — tiny particles 1,000 times smaller in width than a human hair — have improved the effectiveness of insecticidal efficacy.

Sabliov, who has worked with nanoparticles on other projects, creates the particles for this project in her lab with research professor Carlos Astete. The particles are made out of zein, a biodegradable corn-derived protein.

Davis tested the nanoparticles with the insecticide methoxyfenozide for two years on soybean plants. This year he is using the insecticide chlorantraniliprole. He is looking at the insecticide's ability to control soybean loopers.

So far, the research has shown that nanoparticles increase the efficacy of the insecticide.

"Particles stick to the surface and release chemicals for a longer period of time," Sabliov said.

Sabliov also was able to confirm the presence of the nanoparticles on the leaves by dipping the leaves in a compound of fluorescently-tagged nanoparticles for 15 minutes, then quantifing the amount of fluorescence in the plant.

Improving insectical persistence on the plant offers more protection against the soybean looper, a pest that feeds on the leaves.

"The soybean looper can defoliate a plant," Davis said. "Without leaves, the plant can't undergo photosynthesis." This can lead to pods that won't fill with seeds and a decreased harvest.

The researchers also were able to see the effects of the insecticide entrapped in nanoparticles by feeding insecticide-treated leaves to soybean loopers. Davis said they fed the loopers leaves with just nanoparticles, fed them leaves with just the pesticide, and fed them leaves with the pesticide entrapped in the nanoparticles.

"The nanoparticles alone did nothing" Davis said. "The pesticide alone killed insects, but it only lasted for about 14 days."

The results showed the nanoparticles with insectide killed insects for 21 days.

"So growers would get an extra week of coverage, which could make a difference in yield and reduce the need for additional insecticide applications," Davis said.

With longer lasting insecticides that adhere better to the leaf surface, growers can use less of the chemical on their crops. Sabliov and Davis said this can help farmers save money and is better for the environment. The researchers said this technique may be applicable to other products, such as fertilizer, fungicides and herbicides — but more research would be necessary. **Tobie Blanchard**

Liu applies pharmaceutical research to sprayer cleanout

Herbicide residue that remains in spray equipment, even after triple rinsing, can pose problems, especially when the residue is from 2,4-D or dicamba and the next job is soybeans.

LSU AgCenter researcher Zhijun Liu has been working with solubilizers for years with pharmaceuticals. Now, he's testing his solubilizers in agricultural spray equipment with the goal of improving the cleanout process.

The challenging issue is removing herbicide residue from nozzles, hoses, pipes and connectors — particularly if the residue dries before the cleanout process begins.

"Some herbicides, particularly 2,4-D and dicamba in their acid forms, do not readily dissolve in water," Liu said. "Adding a solubilizer in the rinse will help remove more of the residue from the equipment."

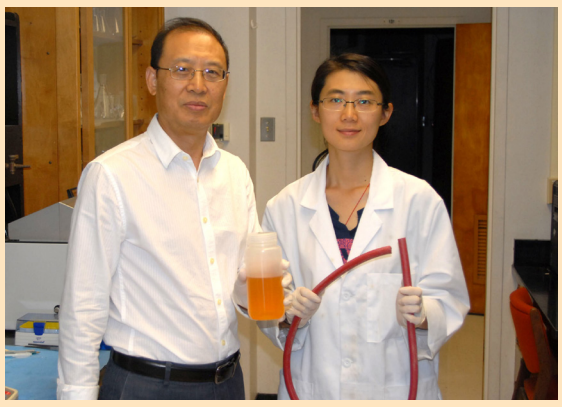
Liu's solubility enhancement compounds have been shown to work well in medical arenas, so they should perform well in agricultural applications, he said.

"We aim to solubilize more residues and do a better job of cleaning the equipment," he said. A bonus is that the compounds he's already developed are food-grade, derived from plant materials. "They're naturally occurring and environmentally friendly."

Liu has identified five to eight compounds he believes will do the job with agricultural chemicals. "The preliminary tests show promise in the laboratory," he said.

The program is in its initial stage, focusing on the chemistry of the herbicides and using instrument analysis to evaluate the effectiveness of the solubilizers.

"We want to identify promising compounds and then move on to equipment tests," Liu said. **Rick Bogren**



Zhijun Liu, left, holds a container of a solubilizer solution in water, and post-doc researcher Yixuan Dong holds a length of rubber tubing typical of commercial spray equipment. It's difficult to clean herbicide residues from the hoses because of the porosity. Photo by Rick Bogren

Different species may be source of Cercospora diseases

Scientists have long believed Cercospora leaf blight and purple seed stain are caused by the pathogen *Cercospora kikuchii.* A group of LSU AgCenter researchers led by Sebastian Albu, however, recently discovered that a different species of Cercospora is causing leaf blight and purple seed stain in Louisiana. That discovery is leading researchers in a new direction.

Cercospora flagellaris has been isolated from a wide range of host species, said Vinson Doyle, an AgCenter mycologist. Unlike kikuchii, it's considered a "generalist" that lives on multiple host plants.

Doyle and graduate student Zac Carver are now looking for sources of inoculum on other host plants by surveying alternative hosts beyond soybean field borders.

Researchers may have underestimated the causes of Cercospora leaf blight and purple seed stain and are now investigating if more than one source of the pathogen may be responsible for the different diseases. "We want to determine if the cause of purple seed stain is seed-borne or originates elsewhere," Doyle said.

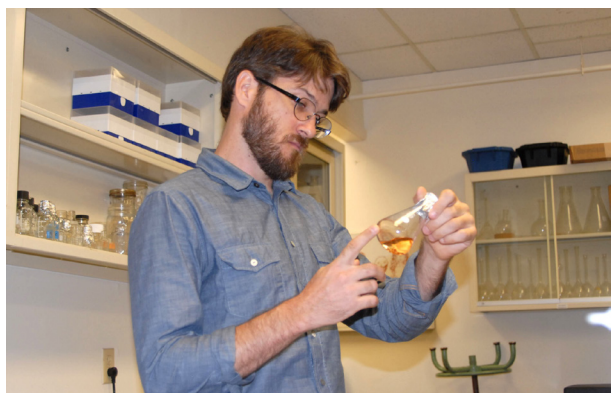
The researchers believe the pathogen is on the seed coat or just under it, he said, so they're using chlorine gas as treatment to disinfest the seed. "We're looking at the safe length of time that will eliminate the pathogen without affecting seed germination or seedling vigor."

Doyle is working with plant pathologist Trey Price at the Macon Ridge Research Station to determine if pathogens on seed from different areas of the country remain in the plants after planting and during development.

Price planted seeds from Arkansas, Illinois and Tennessee, and the researchers will sample the leaves and seeds to see if the pathogens match the ones initially on the seeds.

"We want to see if the inoculum comes with the seed or is airborne from other hosts," Doyle said. "We may be able to find alternatives to mitigating disease without widespread use of fungicides, especially if the pathogen is seed-borne."

This new research approach has three objectives: first, to disinfest seed to see if it reduces disease severity; second, to determine the genetic relationship between isolates from seed and those that show up on blighted leaves; and third, to identify alternative host plants for *C. flagellaris*. **Rick Bogren**



LSU AgCenter mycologist Vinson Doyle examines cultures of Cercospora isolated from soybean seed. DNA will be extracted from these cultures to be used in further research. Photo by Rick Bogren

2016 Soybean and Grain Research and Promotion Board Funded Projects

Ag Economics **$66,840**

Costs & Returns from Irrigating Soybeans in Louisiana, Krishna Paudel

Economic Impact of Groundwater Salinity in Soybean & Grain Production in Louisiana, Krishna Paudel

Biological & Ag Engineering **$29,000**

Nanoparticles for Improved Pesticide Delivery, Cristina Sabliov

Communications **$9,500**

2016 Louisiana Soybean & Grain Research & Promotion Board Report, Frankie Gould

2016 Pocket Field Guide for Corn & Sorghum Weed, Insect and Disease Identification, Frankie Gould

Dean Lee Research Station **$309,241**

Agronomic Research to Improve Soybean Production in Louisiana, Ron Levy

Soybean and Grain On-Farm Demonstration Program, Ron Levy

Improving Soil Fertility & Agronomic Management in Louisiana Soybean Production, Ron Levy

Corn On-Farm Demonstration Program, Dan Fromme

Variety Evaluations & Wheat Disease Management in Corn and Grain Sorghum in Central Louisiana, Boyd Padgett

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

Integrating Soybean Insect, Weed and Stress Management, Julien Beuzelin

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

Evaluation and Determination of Weed Management Strategies for Louisiana Grain Crops, Daniel Stephenson

Weed Management Strategies for Louisiana Feed Grain Crops, Daniel Stephenson

Entomology **$93,300**

Integrated Management of Changing Soybean Insect Pest Complexes, Jeff Davis

Soybean Looper Population Growth Rates on Herbicide-resistant Weeds, Jeff Davis

Explore Resistant/Tolerant Varieties for Managing Sugarcane Aphids 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 **$130,219**

Refining Soybean Insect IPM Strategies for Louisiana, David Kerns

Updating Field Corn & Grain Sorghum IPM Strategies, David Kerns

Managing Diseases in Louisiana Grain Sorghum, Trey Price

Corn & Wheat Disease Management in Louisiana, Trey Price

Foliar & Soil-borne Soybean Disease Management in Louisiana, Trey Price

Northeast Research Station **$189,609**

Enhanced Efficiency Nitrogen Fertilizers (EENF) Under Simulated Heavy Rainfall Conditions, Donnie Miller

Evaluating Management Decisions on Late-Season Losses in Louisiana Soybean Production, Donnie Miller

Soybean Weed Control Research in Northeast Louisiana, Donnie Miller

Development of Weed Management Programs in Northeast Louisiana Corn and Grain Sorghum, Donnie Miller

In-Field Evaluation of Foliar Fertility for Soybean, Donnie Miller

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

Compatability of Cover Crops and Fall-Applied Residual Herbicides, Donnie Miller

Plant Pathology **$344,839**

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

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 & Investigations on Graft & Seed Transmission, Rodrigo Valverde

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

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

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

Soybean Scouting Program for Disease & Disease Resistance, Clayton Hollier

Management of Plant-Parasitic Nematodes In Soybeans, Charles Overstreet

Red River Research Station **$158,761**

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 & Nutrient Use Efficiency in Soybean & Corn Production under Different Soil Types, Syam Dodla

Optimization of Nutrient Use Efficiency of Corn Through Integrated Use of Organic & Inorganic N Fertilizers Under Different Irrigation Regimes, Syam Dodla

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

Impact of Water Policy Changes on the Economic Outlook of Louisiana's Soybeans and Grain Crop Production, Naveen Adusumilli

Management of Phosphorus and Potassium Fertilization in Corn and Soybean Rotation Under Different Irrigation Regimes, Syam Dodia

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 & Soil Sciences **$249,600**

Development of DNA-Based Markers to Complement Wheat Breeding for Herbicide & Disease Resistance, Niranjan Baisakh

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

Management Strategies of Double Crop Soybeans, Lisa Fultz

Integration of Cover Crops in Louisiana, Lisa Fultz

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

Improved Grain Sorghums for Louisiana, Gerald Myers

Soil Fertility Research: Improving Yield & Alleviating Disease in Soybean Production, Brenda Tubana

Nitrogen Budget & 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 **$1,746,519**

Demonstration fields help farmers make management decisions

On-farm demonstrations allow producers a first-hand look at how well crop varieties perform on the many different soil types and environments found across Louisiana.

This year there were 57 on-farm variety trials — three for wheat, 15 for corn and 38 for soybeans. The fields can be found in 23 parishes.

This year's abnormally wet spring played havoc with the planting of field trials across the state, but particularly in the central and northern part of the state. Five corn plots were lost or cancelled because of floods or conditions deemed too wet to plant. Those fields were in Morehouse, Madison, Grant, Avoyelles and Concordia parishes. Five soybean plots were cancelled because of adverse conditions. The parishes affected were Acadia, Jefferson Davis, Natchitoches, Tangipahoa and Vermilion.

"We are looking at different varieties and how well they perform yield-wise. We are also looking at some irrigation-related issues, trying eight different fungicides and seeing how well they perform, testing some insecticide treatments and examining selected herbicide technologies," said Ronnie Levy, LSU AgCenter soybean specialist.

Levy said soybean acreage comprised approximately 49 percent of the state's cropland acreage in 2015 and stressed the importance of having a large number of trials on as many different soil types as possible. The majority of the soybeans are Group IV beans, but he said there are some in Groups III and V.

David Smith, who farms in Beauregard Parish, is a big proponent of demonstration fields. He has plots of wheat, corn and soybeans. He has participated in the program since the 1990s and says geography is one of the main reasons.

"Being in Beauregard Parish, we are in an area that is nontraditional when it comes to row crops," Smith said.

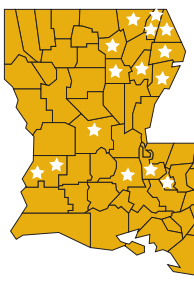
Smith had 600 acres of wheat in his trial this year. He generally has close to 1,000 acres of wheat, but last year's episode of scab disease and a wet harvest caused him to scale back on his acreage.

While he finds the information valuable, Smith doesn't solely base his decisions on verification results. "But it lets me see what works in my fields," he said.

Jeffrey Bordelon also has three crops in the variety trials — sorghum, wheat and soybeans. He is in his third year of participating in the program, and he has found the program to be useful to his Avoyelles Parish operation.

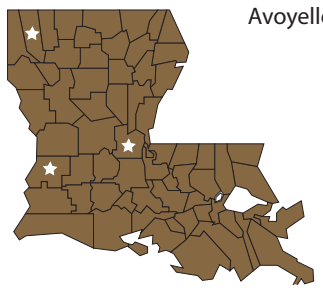
"I get to see first-hand how a particular variety performs and how disease-resistant certain varieties are. I have definitely used the information in determining what I will plant on my land," he said. **Craig Gautreaux**

Corn Variety Trials



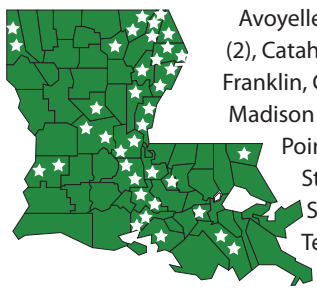
Beauregard (2), Caldwell, East Carroll, Franklin, Madison, Morehouse, Ouachita, Pointe Coupee, Rapides, St. Landry, Tensas, West Baton Rouge, West Carroll (2)

Wheat Variety Trials



Avoyelles, Beauregard, Bossier

Soybean Variety Trials



Avoyelles (2), Beauregard (2), Caddo (2), Catahoula, Concordia (2), E. Carroll, Franklin, Grant, Iberia (2), Lafourche (2), Madison (3), Morehouse (2), Ouachita, Pointe Coupee, Rapides (2), St. James,St. Landry (2), St. Martin (2), St. Mary, Tensas (2), Washington, West Baton Rouge, West Carroll (3)

Battle continues to prevent resistance to herbicides

As farmers continue to fight weeds that are resistant to commonly used herbicides, LSU AgCenter weed scientists are working to learn more about new control technologies and the best ways to use them in Louisiana.

Two new herbicide systems — Xtend, a technology providing plant resistance to dicamba, and the Enlist system, which offers resistance to 2,4-D — should be on the market soon, offering producers additional modes of action to tackle glyphosate-resistant weeds, including Palmer amaranth and other broadleaf weeds.

AgCenter weed scientists Donnie Miller and Daniel Stephenson have been conducting trials to find out more about the systems, which should provide farmers a boost in fighting some weeds that became resistant to glyphosate in recent years.

Farmers in other states are now seeing resistance to PPO herbicides, such as Valor, Reflex, Ultra Blazer and Cobra, which exhibit the most common alternative mode of action used on Louisiana soybeans after glyphosate. Though PPO resistance has not yet been documented in Louisiana, the issue highlights the importance of using multiple weed control products, Miller said.

"Producers have really gained an appreciation in the past several years for this resistance issue," he said. "They're understanding that the more modes of action you have available, that alternately kill by impacting different target sites within the plant, the better."

Using different herbicides, however, can be a problem if farmers do not apply them carefully or clean their spray tanks, Stephenson said.

Heavy rains caused flooding that delayed many farmers this spring, forcing some of them to make herbicide applications on corn and soybean crops at the same time, he said. Not taking time to clean spray tanks ended up costing some farmers.

Timing of herbicide applications, which is key to a product's effectiveness, also was a problem this year.

Stephenson has been studying how to optimize the application timing of both pre- and post-emergence herbicides so yields can be maximized. For example, late-season grass weeds are one of the biggest issues in grain sorghum production, so he's trying to determine if making both pre- and post-emergence applications will offer better control than pre-emergence.

Stephenson also is doing a four-year study to find out if high-intensity herbicide treatments in corn and soybeans — pre-emergence followed by a post-emergence program as opposed to post-emergence alone — are worth the extra cost.

"We want to see what, in the end, reduces the soil seed bank the best," Stephenson said.

He and Miller are also working on a weed control project in winter cover crops, whose popularity has grown considerably in the past five years in Louisiana. Cover crops improve soil health and help maintain soil integrity during the winter, but can pose issues with winter-spring weed control, Miller said.

"These weeds can harbor insects and compete with the winter cover crop, and potentially offset the benefits of the cover crop," he said.

Most herbicides for winter weeds will also kill cover crops, Miller said. He's working to identify herbicide options that don't cause much damage to the cover crops but still offer effective weed control. **Olivia McClure**

Donnie Miller, LSU AgCenter weed scientist and research coordinator at the Northeast Research Station, talks to the group gathered for the station's annual field day on June 16. Photo by Johnny Morgan

Research targets crop disease management

LSU AgCenter plant pathologists are working on a number of projects to help Louisiana farmers make better disease management decisions.

Zhi-Yuan Chen, AgCenter plant pathologist, has been working to find new ways to control soybean rust. He and his graduate students are comparing differences in soybean gene expression levels between a pair of soybean breeding lines — one that is resistant to rust and one that is susceptible to the disease.

"We found about 20 genes that could be involved in soybean resistance to rust and are trying to 'turn off' each of them individually to see which one is important for plant resistance to rust," Chen said.

One of his students has also found three new genes in the rust pathogen that can be manipulated to slow rust disease development on infected soybean leaves, Chen said.

AgCenter scientists continue to focus on Cercospora leaf blight — a disease caused by a fungal pathogen called C. kikuchii — which for years has been a major concern for soybean producers. No fungicides effectively control the disease and no resistant soybean varieties are available.

Chen and his students have been searching for a more effective way to control Cercospora leaf blight. One of Chen's students recently discovered a gene in that pathogen that can help regulate the level of cercosporin, the toxin produced in infected soybean plants that causes diseases symptoms.

"Our lab is now looking for a way to suppress toxin production by the pathogen in infected soybean plants," Chen said.

Plant pathologist Clayton Hollier is studying how both fungicides and cultural practices can be used to reduce the impact of Cercospora leaf blight and frogeye leaf spot on crop yield and quality.

"Cercospora blight does not react to fungicide use consistently, so I began to incorporate the use of cultural practices, especially plowing to bury crop residue," Hollier said. "If it works, the plan is to reduce the amount of initial inoculum from crop residue available for attacking next year's crop."

Hollier is also working on a project that involves scouting fields around Louisiana to determine the presence of major soybean diseases and their severity. That information is sent to AgCenter extension personnel, agricultural consultants and producers so they can make informed management decisions.

Plant pathologist Trey Price is conducting trials as part of several ongoing projects at the AgCenter's research stations in Alexandria, Winnsboro and St. Joseph as well as on producers' farms. He is evaluating crop hybrids and varieties in the AgCenter Official Variety Trial program for resistance to naturally occurring plant pathogens in Louisiana.

Price is also evaluating commercially available and experimental fungicides — including seed, in-furrow and foliar treatments — to find the best options for disease management in Louisiana's field crop production.

He is quantifying yield and quality losses caused by disease, determining when and if fungicide applications are necessary and monitoring pathogen populations for fungicide sensitivities.

Read about plant pathologist Ray Schneider's research on Cercospora leaf blight on page 4. **Olivia McClure**

Soil texture may be key to nematode control

Charlie Overstreet is using site-specific agriculture for his studies of nematodes in soybeans.

The LSU AgCenter researcher is studying the effects of soil texture on nematode injury in soybeans and how site-specific management can economically control Southern root knot nematodes and reniform nematodes.

By measuring electrical conductivity in the soil with a Veris EC mapping system, Overstreet is looking at soil textures at depths of 1 foot and 3 feet, then comparing harvest results with three nematode treatments.

"I'm looking at variable textures and different nematicides to see what kinds of response we get," Overstreet said. "We're using an untreated area and comparing results with seed treated with Avicta Complete Bean, a soil fumigant with Telone II and a combination of both the seed treatment and soil fumigant."

The test areas include Commerce silt loam and Bruin silt loam soils.

"The information can lead to developing different management strategies based on soil texture," he said. "We've had good results in cotton. We don't know yet for soybeans."

Overstreet also is looking at how variety selection can reduce nematode damage on grain sorghum. "Almost everything is susceptible to Southern root knot nematodes," he said.

"We know sorghum is susceptible to root knot nematode, and we're looking at variability among varieties," he said. "We've chosen three varieties – one very susceptible, one very resistant and one somewhere in between – to see how variability will affect populations of nematodes for the next crop."

The study will measure nematode populations and harvest yield. And because it's the first year, Overstreet doesn't know if the results will show if different varieties provide economic advantages. **Rick Bogren**

LSU AgCenter nematologist Charlie Overstreet makes a presentation on products available to control nematodes at the Northeast Research Station field day in St. Joseph on June 16. Photo by Johnny Morgan

Louisiana Soybean & Grain Research & Promotion Board Report

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Project seeks to find optimum N rates for corn-soybean rotation

Dan Fromme, LSU AgCenter corn specialist, is working on a project to determine the optimum rate of nitrogen fertilizer for corn grown in rotation with soybeans.

He said soybeans add nitrogen to the soil but it's not clear how much of that nutrient is available the next year for corn. "Do we lose it to denitrification or leaching from heavy rains?"

The project, in its first year, is being conducted on corn crops in Concordia, Rapides, Avoyelles and Pointe Coupee parishes, in addition to a field at the Dean Lee Research and Extension Center near Alexandria. Fromme said north Louisiana was originally included in the project for 2016, but flooding eliminated those locations.

Soil samples were taken at each location before planting to determine the amount of nitrogen in the soil before fertilizer was applied.

Liquid nitrogen (32-0-0 with urea and ammonium nitrate) was knifed into the soil after planting corn at the rates of 150, 175, 200 and 225 pounds per acre.

After harvest, yield, test weight and moisture will be measured. **Bruce Schultz**

Dan Fromme, LSU AgCenter corn specialist, checks corn at plots in Avoyelles Parish. Photo by Bruce Schultz

Scientist studies quality of tailwater used for irrigation

Summer weather brought severe seasonal drought conditions to many farms in Louisiana this year, highlighting the need for farmers to find dependable sources of irrigation water to meet crop needs during critical stages of growth.

Changyoon Jeong, a water quality specialist at the LSU AgCenter Red River Research Station, is studying options for Louisiana farmers, including tailwater recovery systems that capture water that runs off the field and can be reused for irrigation. While useful in some cases, these systems can also promote greater nutrient losses and salt accumulation depending on the soil type, Jeong said.

Some of Jeong's work has focused on the Natural Resources Conservation Services' Red Bayou Watershed Project in the Shreveport area. The project pumps water from the Red River into Red Bayou, giving farmers in northwestern Louisiana access to surface water they can use for irrigation instead of putting further pressure on the area's declining aquifer.

"However, the quality of the tailwater from the Red Bayou has not been fully tested for use as irrigation water in soybean production," Jeong said.

Jeong has been monitoring the quality of water from Red Bayou used for irrigation. Salinity in water is influenced by season, weather conditions and the presence of agriculture activities, he said.

He took soil samples from two soybean fields — one with sandy soil, the other with clay soil — at the beginning of the 2016 crop season to measure nutrient levels.

As the irrigation water moves down the slope of the field, so do salt and nutrients. In samples taken from the field with sandy soil, Jeong found that electrical conductivity — which indicates salinity — increased as he moved from the top of the field toward the field's low point. In clay soil, electrical conductivity decreased moving down the field's slope, but carbon and nitrogen increased, he said.

Soil pH increased along the slope of the clay soil field after irrigation, but pH was higher at the beginning of the slope in the field with sandy soil.

"Research data showed that higher nutrient losses in sandy soils and more salinity accumulation in clay soils can be caused by tailwater irrigation," Jeong said.

Nutrient leaching through the soil profile is another concern when irrigating, Jeong said. In tests, he found that nitrate concentrations rose with increasing depths in sandy soil. Nitrate accumulated at shallower depths in clay soil. Soluble, reactive phosphorus showed significant downward movement in both soil types, he said. **Olivia McClure**