Soil type determines soybean irrigation decisions

Moving into the second year of data collection for his soybean irrigation study, LSU AgCenter agronomist Josh Lofton says soil type is a major factor in irrigation decisions with soybeans.

The two objectives of the project are to look at how irrigation is managed in soybeans and how management in soybeans differs depending on whether you’re farming light soils, like on the Macon Ridge, or in heavier soils, like those found across the Mississippi alluvial valley.

Trial locations are at the Macon Ridge Research Station and at the Northeast Research Station at St. Joseph. Both of these areas are known for soybean production. The difference is the amount of water needed to produce the crop.

Lofton wants to find out the optimum time to apply irrigation to obtain maximum benefit.

“Essentially we are continuing the project we started last year,” Lofton said. “That’s because we found a lot of good results last year in the project.”

The project consists of four different timing sequences for irrigating the soybeans at each location, he said.

“The first application of irrigation water is applied when they are planted, then at four or five trifoliates, which is near the end of the vegetative stage,” Lofton said. “Then again at mid-flower, what growers call R2 to R3, and finally at pod set, which is our current recommendation, as well as a late-season irrigation at seed fill.”

Soil fertility studies aim to save farmers money

Lofton said economics is the determining factor in most decisions about irrigation.

Last year was a wet year, and that presented some challenges and limited the benefit of some of the earlier irrigations, Lofton said.

“In the alluvial soils, we started irrigation at pod set, and we lost no yield,” he said. “We had a tremendous amount of moisture in early season last year, and we only applied one irrigation between flowering and pod set, where in most years you need more.

“You could delay irrigation until pod set in soybeans at St. Joseph in those deep Mississippi alluvial soils,” he said. “But that was not the case at Macon Ridge.”

Lofton said there was the possibility of yield loss if you waited until pod set, as well as losing yield if you waited until flower was.

“So we needed to be irrigating during late vegetative stages to reduce significant yield loss,” he said. “In really hot, dry years, we probably needed to have watered at least once during this stage.”

So far, the project has later irrigations in the St. Joseph area, which means farmers don’t have to turn on those expensive pumps as often as on the lighter soils.

“You can definitely save yourself one or two irrigations on those deep Mississippi soils,” Lofton said. “But you can’t do that on the light soils at Macon Ridge when it starts to get hot and dry.”

LSU AgCenter soil specialist Beatrix Haggard is working on soil fertility projects to help corn and soybean farmers determine the nutrient levels they need for their crops.

She is looking at soil nitrogen levels on-farm to see if the element moves down within the top 2 feet of soil after heavy water fall. Her study focuses on fields where soybeans have been followed by corn and on fields where corn is grown continuously.

She expects that nitrogen levels will be higher in fields where soybeans are grown because of soybeans’ nitrogen-fixing capability and ability to break down at a faster rate. Haggard is also evaluating the use of enhanced-efficiency nitrogen fertilizers.

“Those products help to slow the transition of nitrogen into forms that are more prone to loss in the soil system,” she said. “They are being evaluated for both liquid urea ammonium nitrate and urea in corn production systems on Sharkey and Gigger soils.”

The project also is investigating the use of a handheld X-ray fluorescence device that can measure levels of micronutrients – including potassium, manganese, zinc, and iron – in living plant material in the field.

“We’re still in the early stages of that work,” she said.

The readings from the device are being compared to the results of laboratory analyses of plant tissue to get a more accurate determination of the nutrient levels. Eventually, she said, the device could be used as a diagnostic tool to scan a field and map nutrient deficiencies.

“Our hope is we can catch problems early enough in the season so nutrients could be applied at the critical stage of a plant’s growth,” Haggard said. A second project is looking at the optimum use of potassium fertilizers.

A large-scale on-farm test is in its first year in corn on a Caddo Parish farm. A similar trial was evaluated in Tensas Parish in 2013. Yields will be compared at zero, 60 and 120 pounds of potassium per acre, she said.

At the Macon Ridge Research Station, different potassium rates are being used on research plots for soybeans and corn, and the applications are being made in fall and spring to see if the seasonal difference affects a crop.

Potassium also moves through the soil, she said, so the project should reveal the extent of movement.

Soil samples are being taken before fertilizer is applied for both the fall and spring treatments. Bruce Schultz
The Louisiana Soybean and Grain Research and Promotion Board invests your checkoff dollars on projects that address Louisiana’s most important production and marketing issues.

The Board administers both of the national checkoffs for soybeans and grain sorghum in Louisiana as well as the state checkoffs for wheat and corn. By working with the national checkoff programs, the Board is able to obtain funds for research specific to Louisiana’s needs. As federal and state funds become more limited, producer-generated funds are essential for the development of solutions to Louisiana’s problems.

This report describes some of the activities funded by your checkoff dollars. The majority of this effort is focused on applied research projects addressing various agronomic issues that adversely affect our yields. Several projects are evaluating and adapting technologies that identify and manage production issues, such as irrigation, soil fertility and weed, insect and disease management issues. Technology and information gained from research are also extended through the support of the various demonstration programs.

The Board also collaborates with other states on regional research efforts. Additional resources and efficiencies are gained by participate in research efforts with both the Mid-South Soybean Board and the Alltoxin Mitigation Center of Excellence. Through cooperative programs, we are able to increase the funds and resources available to address selected regional issues and focus more attention on selected problems.

While the Board is mainly focused on production research, market development activities are also supported with the United Soybean Board, National Corn Growers Association and the U.S. Grains Council. At the national level, investments in foreign market development projects and new uses for grain are paying dividends. These efforts are focused on building strong demand for both traditional export and domestic markets.

The Board will be meeting November 20-21, 2014, in Baton Rouge at the LSU AgCenter to hear reports on funded projects and review new proposals. Checkoff dollars make these efforts possible. 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

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New AgCenter team studies water resources, efficiency

The AgCenter has formed a water resources team at the Red River Research Station near Bossier City, Louisiana. The group’s members are studying various issues to help producers manage irrigation systems more efficiently and maintain good water quality.

Stacia Davis, AgCenter irrigation engineer, will work with smart irrigation technologies such as evaporation and transpiration, or ET, controllers and soil moisture sensors. These devices allow farmers to measure how much water they use, determine if it is efficient and schedule applications based on plants’ needs.

AgCenter economist Naveen Adusumilli is investigating the economics of different water management practices and crop production strategies. Louisiana farmers tend to rely on groundwater for irrigation, he said, which is impacting production costs because water table levels are fluctuating.

Syam Dodla, AgCenter agronomist, is studying ways to lower production costs and minimize environmental impact without negatively affecting crop health or yields. Irrigation frequency and amount affects other factors like how much fertilizer must be applied and which types work best with more or less water. Dodla hopes to identify how much fertilizer and water are optimal in terms of cost, crop quality and efficiency.

AgCenter water quality expert Changyoon Jeong is examining different methods to keep contaminants out of runoff water in order to develop viable management practices for growers. One option is planting filter strips of grass along edges of fields to catch runaway nutrients. Farmers can also apply soil amendments such as Biochar, which absorbs excess chemicals and water.

Olivia McClure (Photos by Olivia McClure)

New wheat field guide will be ready in 2014

Tackling weed, insect and disease problems quickly is critical for farmers to avoid damage and maintain good yields. That’s why the LSU AgCenter is producing a wheat field guide that growers and consultants can use to easily determine solutions.

Frankie Gould, AgCenter communications director, said the guide contains general information, images and identifying characteristics of 18 weeds, six insects and 15 diseases. Seven diseases that affect oats are included as well.

The guide also has information on other issues that affect wheat, such as waterlogging, freeze damage, drift, nutrient deficiencies and vernalization.

Relevant, more detailed sources on the AgCenter website, such as a weed identification page on Louisiana soybean and grain production visit: www.lsuagcenter.com

For more information on Louisiana soybean and grain production visit: www.lsuagcenter.com
LSU AgCenter plant pathologist Clayton Hollier has been studying the yield and quality loss potential from a complex of soybean diseases. “I’m taking all diseases into consideration and calculating the yield difference,” he said.

Instead of trying to determine the yield loss of a specific disease, Hollier wants to know how the entire disease spectrum will affect yield, similar to what a farmer’s field experiences. “I’m looking at the total package because that’s what the grower has to do,” he said.

To conduct the study, Hollier uses different fungicide application timings as well as different fungicides to see what effects those variables have. Some plots are not treated to be able to compare the differences of the best treatments.

In the past year, Zhi-Yuan Chen’s laboratory has been working on using genetics to increase soybean resistance to diseases, such as Cercospora leaf blight and soybean rust.

Joseille Rezende, a Ph.D. student working under Chen’s supervision, found that the Cercospora pathogen produces a protein to protect its cell wall. She has cloned the gene for making this protein and is testing whether mutants that do not make this protein have a reduced ability to infect soybeans.

She also is studying the soybean genome sequence database to look for a protein identified with the potential to protect soybeans from Cercospora and to see whether any soybean lines she has screened in the past for Cercospora resistance contain high levels of this protein.

Another Ph.D. student, Dongfang Hu, has been testing several soybean proteins for their contribution to resistance to soybean rust disease. She has also been trying different ways to suppress rust growth through a new genetic technology in plant disease control.

In addition, Hu is looking into gene expression differences between soybean rust-resistant and susceptible soybean lines to identify more candidate genes that could enhance soybean rust resistance.

“Overall, these efforts could offer new and more effective approaches to control soybean fungal diseases,” Chen said. Bruce Schultz

Researchers focus on stink bugs, other soybean insect pests

LSU AgCenter entomologist Jeff Davis is working with redheaded stink bugs to see which soybean varieties have resistance to what has become the pest’s worst insect pest.

Last year, the study used 10 different varieties. Six varieties showed as much as a 20-bushel difference with spraying, while four varieties showed little or no difference, Davis said.

This year, the study is testing 20 varieties.

Davis also is studying the redheaded stink bug’s resistance to acephate.

“If we lose acephate, we’re not going to have anything that gives us more than five days of control,” he said.

The alternative is Endigo, but it tends to kill beneficial insects that control soybean loopers, increasing pest’s population.

Another Davis project is determining whether harvest aids used in fields with heavy stink bug populations will cause the insect to feed heavily on seed pods, damaging the beans.

It’s possible that a farmer could justify mixing an insecticide with a harvest aid tod aminimize potential pod damage and to stop stink bugs from moving into an unharvested field, he said.

“I get asked questions about this issue every year, and we hope this study will provide some answers,” Davis said.

Another project is aimed at soybean loopers and whether they feed on the weed Palmer amaranth more readily than soybeans. He said results last year showed the insects preferred soybeans.

This year, the study is focusing on adult loopers to see if they are attracted to flowering Palmer amaranth more than soybeans.

David Kerns, LSU AgCenter entomologist at the Macon Ridge Research Station in Winnboro, is looking at the efficacy of soybean seed treatments to see if the neonicotinoid seed treatments are worth the expense. “It takes a number of years to figure that out,” he said.

The project is a regional endeavor with researchers from Mississippi, Tennessee and Arkansas.

The seed treatments are aimed at thrips and below-ground pests such as grubs. Kerns said the seed treatments sometimes also seem to promote an unexpected yield boost for no apparent reason.

Another of Kerns’ projects involves the economic threshold for spraying for bollworms in soybeans. A cage project is being used to determine a correlation between bollworm populations and yield effects.

“Depending on the stage of a soybean plant and the size of the bollworms, the amount of damage they cause will vary greatly,” he said. “We’re still in the early stages of pulling this data together.”

Healthy soybean plants can compensate and develop new pods after bollworms have taken their toll on existing pods, but stressed or matured plants may not be able to do that, Kerns said.

This project also is in collaboration with researchers in other states.

A new soybean pest, the kudzu bug, which made its first appearance in Louisiana in 2013, also is on Kerns’ radar. Higher numbers of the insect have been reported in 2014 in northeast Louisiana.

“Next year, we should have an even higher number,” he said.

The threshold for spraying for the insect is an average of one immature bug for every net sweep, he said.

Yields may be reduced as much as 60 percent from kudzu bug feeding.

Bruce Schultz

2014 Louisiana Soybean & Grain Research & Promotion Board Report
Looking for the ‘perfect’ soybean

The ‘perfect’ soybean would have great disease and herbicide resistance, excellent drought and salt tolerance, be able to withstand insect pests and be high-yielding. And LSU AgCenter plant breeder Bruce Buckley is on a quest to find it.

Since 2007, Buckley has been making soybean crosses at the Red River Research Station near Bossier City to find this elusive variety. Ultimately, the perfect soybean may be unattainable, but Buckley is confident that improvements can be made on existing varieties grown in Louisiana.

“Many of the soybean varieties grown in Louisiana have been plaguing producers not only in Louisiana but in other Southern states. Disease symptoms first appear as petiole lesions and purple-bronzing of upper leaves at the late R2 and early R6 soybean growth stages. Though major symptoms appear late in the season, infection occurs earlier, and the fungus remains latent for a period of time. Severe infections can result in significant defoliation, substantial yield loss and reduced seed quality.

The seed disease purple seed stain is also caused by the same fungus, ‘Fungicides have not been very effective in fighting Cercospora, so that means yield loss is still significant,’ Buckley said. ‘We are placing an emphasis on finding varieties that show some resistance to this disease.’

Buckley is examining a few hundred lines and indicated that four to six have shown promise against Cercospora. While not symptom-free, the varieties display symptoms that have been less severe and have come later in the growing season, thereby lessening potential yield loss.

Another trait that is high on Buckley’s list is insect pest tolerance. Hot and dry conditions are common throughout Louisiana’s growing season. ‘We are looking at material that has shown promise in combating drought-like conditions. This material has slow-wiltting lines and conserves moisture better,’ he said.

There is a growing concern that major aquifers across the South are being depleted. With soybean acreage trending higher, reducing the amount of irrigation statewide can reduce the pressure on these vital aquifers without decreasing the potential yield of soybeans.

Another trait garnering attention from Buckley is salt tolerance. Growers in the north central and northeastern parts of Louisiana have seen high salinity levels in their irrigation water. This has led to reduced yields for farmers who have encountered this situation.

For growers who have access to surface water for irrigation, using it may be a solution. For those who rely on well water, a salt-tolerant soybean is essential in alleviating the problem.

Insect resistance management is critical for Bt corn production. Insect resistance to Bt corn is usually excellent against its target pests, Huang said. Insect resistance management is necessary to delay resistance development.

Huang is working to identify effective ways that can delay resistance development. He hopes to determine exactly when populations become resistant and how to slow down resistance development.

Knowing this will help detect the possibility of resistance development in the field, Huang said, giving farmers time to take action. For example, they can spray pesticides or use other Bt corn products to control the Bt-resistant pests.

Meanwhile, scientists are constantly updating Bt corn varieties, Huang said. His efforts to understand how pests develop resistance is helpful in that Bt corn breeders will know which resistance genes last the longest and are most effective. They can also identify ideal gene pyramids, or multiple resistance genes, that are harder to overcome.

Resistance of fall armyworms to Bt corn is already an issue in Florida and North Carolina. The insect is a migratory pest that can move from the Caribbean islands into the U.S. mainland, Huang said. It is therefore important to study conditions in the Caribbean and around the U.S. to understand other factors that may influence the worms’ resistance.

Huang said about 76 percent of the corn grown in the U.S. in 2013 contains Bt proteins. Most of that corn is for feed grains and not human consumption.

Insect resistance management is critical for Bt corn to remain an effective pest control tool. ‘Bt corn has been very effective in Louisiana so far,’ Huang said. ‘Our goal is to have safeguards to ensure the long-term success of Bt corn products.’

Research seeks to improve soybean performance in southwest Louisiana

AgCenter agronomist Dustin Harrell is working to help soybean farmers in southwest Louisiana improve their chances of harvesting a good crop. Growing soybeans in that corner of the state can be a challenge because of the higher incidence of disease. In addition, rice farmers are less likely to plant soybeans on raised beds because of the additional costs.

Harrell is working to determine the best planting dates in a test at the South Farm of the Rice Research Station.

“We’ve only had one year of results so far,” Harrell said. “It will require several years of work to get an optimum planting window.”

Like farmers in the area, Harrell waits until adequate soil moisture is present before planting with a grain drill and 16-inch row spacing. He is not using raised beds or irrigation.

This year, he said, planting for the project was complicated with moisture extremes – either too many days without rain or heavy rainfall in just a day or two.

He planted 12 varieties using maturity groups III, IV and V on April 13, April 23, May 15, June 6 and June 17.

Last year, planting started on March 22 and ended June 12. The best yields were obtained from planting in the window between April 23 and May 23, Harrell said.

He also is working on several soil fertility projects with farmer Kenneth LaHaye, of Evangeline Parish. The research is aimed at determining the optimum rates of potassium and phosphorus and the best time to apply them on soybeans.

Fertilizer was applied at planting, then again at growth stages V-1, V-3, V-5, R-1, R-3, R-5 and R-6. The optimum time for a fertilizer application is at planting, and any delay after that costs yield, Harrell said.

From this study, Harrell hopes to learn if a farmer can economically justify an application of fertilizer at midseason when a crop appears to be deficient in nutrients. Bruce Schultz

Entomologist tries to stay ahead of insect resistance to Bt corn

Fall armyworms and corn borers have long been a concern for Louisiana corn growers. While farmers in the U.S. have planted transgenic Bt corn varieties since the 1990s to biologically control pests, staying ahead of their ability to develop resistance is a constant battle.

LSU AgCenter entomologist Fangneng Huang is studying how insects become resistant to Bt corn, which refers to corn that is genetically modified to contain Bacillus thuringiensis proteins. These proteins are toxic to caterpillar pests such as corn borers and armyworms, enabling plants to kill the pests directly without the use of chemicals.

Bt corn is usually excellent against its target pests, Huang said. “Those pests had been a problem in Louisiana, and now they are under control,” he said. “The corn borer population has been low for a few years.”

Maintaining that low population is a challenge, however. Like any other pest-control methods, Bt corn kills most pests but leaves behind a few that are resistant to the Bt proteins. As those remaining insects reproduce, they can develop a resistant population that is not susceptible to the Bt proteins.

Huang is working to identify effective ways that can delay resistance development. He hopes to determine exactly when populations become resistant and how to slow down resistance development.

Knowing this will help detect the possibility of resistance development in the field, Huang said, giving farmers time to take action. For example, they can spray pesticides or use other Bt corn products to control the Bt-resistant pests.

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Olivia McClure

The proteins in Bt corn are toxic to fall armyworms, such as this one. But gradually the insect pest can develop resistance. (Photo by Olivia McClure)
Dicamba-resistant crops offer weed management options

With the availability of the dicamba-resistant crop technology already available in commercial use, AgCenter weed scientists have been investigating ways to best use the technology in Louisiana crops. Although the availability of dicamba-resistant crops will provide alternative weed management options, the risk of off-target movement of herbicide to sensitive crops is a major problem in adjoining states, Griffin said.

Glyphosate has been and still is an effective herbicide. Its overuse, however, has resulted in glyphosate-resistant weeds, which is a major problem in adjoining states, Griffin said. Glyphosate-resistant johnsongrass and Palmer amaranth populations have been documented in Louisiana. “We are hopeful that new technologies on the horizon will allow us to better manage resistant weeds as well as other weeds that are less sensitive to currently used programs,” he said.

Dicamba-resistant soybeans will be marketed as the Roundup Ready Xtend Crop System and will be tolerant to both glyphosate and dicamba. It looks like it may be 2016 before varieties are commercially available, Griffin said.

The challenge with this new technology is that recommended soybean varieties are extremely sensitive to dicamba. Griffin’s research has shown that one-thousandth of the rate of dicamba reduced yield in a 3 percent yield penalty. Sensitive soybeans are not resistant to dicamba. And one tenth of the use rate reduced yield more than 50 percent.

To put this in perspective, soybeans are more sensitive to dicamba than to glyphosate. Sensitive crops that have the dicamba and are more sensitive to dicamba. Cultivars and ornamentals are also of concern, Griffin said.

Sensitive plants also run the risk of exposure through spray tank contamination. It will be imperative that proper sprayer cleanout procedures be followed. “We want to help growers prepare for what to expect,” Griffin said.

Although the new technology has not been approved yet by USDA or EPA, the labels for the dicamba products to be used in conjunction with the technology are expected to be more restrictive than other labels in the past, Griffin said.

He expects the label to include recommendations on application amounts, requirements for buffer zones around the treated crop, specifications as to nozzle type and limitations on the height of the spray boom above the crop canopy.

“At this time, we have not seen any labels,” Griffin said. “And they won’t come out until EPA approves them.” But the use of dicamba will be restricted with the goal of being to keep the herbicide on target.

“We have had a lot of years to look at this,” Griffin said. “We are prepared to address any problems that may occur. Right now it is important that we educate consultants and growers on how to expect and how to best use the technology to aid in controlling weeds.”

As a result, the AgCenter has formed a herbicide technology task force to provide critical information to Louisiana farmers before the new products hit the market.

Composed of weed scientists, commodity specialists and others in the AgCenter, the Louisiana Department of Agriculture and Forestry, Pesticide Division and representatives from the Louisiana Agricultural Consultants Association, the task force will work on education about the new herbicides, herbicide drift and weed resistance, said AgCenter pesticide safety education coordinator Steven Pope, who’s leading the group with AgCenter weed scientist Daniel Stephenson.

“Every chemical company has made a commitment to provide background information on their chemicals, including the herbicide-resistance issue and the proper nozzle to use for a production program,” Pope said.

In addition to learning about the chemical names and the opportunity to learn about new spray nozzles that reduce drift, said AgCenter engineer Randy Price.

“We want spraying systems that produce droplets, not driftable fines,” Price said. “A spray boom outfitted with a set of spray nozzles will reduce the droplet size so it can be carried across a field. Research has shown that droplets can be carried up to 30 to 60 feet from the target area in normal winds. With sprayer booms requiring as many as 60 to 70 nozzles for proper application, choosing the proper nozzle is critical,” Pope said. “And boom height should be increased to 20 inches to increase the crop surface to minimize drift potential.”

“Drift can be critical to controlling plant diseases, and growers should be keeping the weed on target,” he said.

News is available for soybeans ranks right up there with how much loss is occurring, according to LSU AgCenter plant pathologist Clayton Hollier, who is conducting a study to determine how to cut those losses.

He’s trying to get an accurate measurement within plots of how much yield is being affected by the whole disease spectrum, not just any particular disease.

“The reason we think that approach is the most useful in your case is because people are going to have just one disease typically, but several, each contributing to yield loss,” he said.

“Some of these diseases are so minor it will be hard to measure any yield losses, but others would be very easy to measure. The benefits of this research will be positive for the growers with diseases affecting their crops,” he said.

“I think they are valuable because they are the best way to determine what are the best products that will take care of them,” he said.

Unlike insect problems where you deal with thresholds, plant diseases are caused by pathogens that you cannot count. So growers have to determine how much crop they can do to prevent most of that loss.

“It’s not just about disease; it’s about the bottom line,” Hollier said. “If a fungicide is used, is it going to impact disease development, and will the grower generate more income?”

“Well, he’d better. And he’d better get a lot more than he paid out,” he added. “We measure yield loss so that we understand how much of their disease impact we’re actually dealing with.”

2014 Louisiana Soybean & Grain Research & Promotion Board Report
Grain sorghum research will help improve harvest

LSU AgCenter researchers are studying grain sorghum to help improve harvest potential and save farmers money. One set of projects from 2013 focused on validation of recommended planting dates. Crops were planted on four different dates at three locations—the Dean Lee Research Station in Alexandria, the Macon Ridge Research Station in Winnambo and the Northeast Research Station in St. Joseph. The recommended planting dates are between April 1 and May 1 for south Louisiana and between April 15 and May 15 for north Louisiana.

“At Dean Lee, late frosts severely damaged the early planted crop,” said AgCenter agronomist Josh Lofton. “Macom Ridge has more drought-prone soils, so the assumption was by decreasing the plant population per acre, we could decrease overall plant competition for crop inputs, including moisture,” said Lofton.

The sorghum crop can adapt to lower seeding rates by producing larger, more fully developed heads compared to smaller heads with higher seeding rates. The second planting date in mid-April produced the highest yields across all locations; however, the effect of plant population on crop yield varied. The second planting date at Macom Ridge showed populations could be decreased to 60,000 plants per acre, compared to the recommended 75,000—all without significant yield decreases.

The Dean Lee and Northeast crops did not benefit from the lower plant populations. For most of the planting dates, the current recommendations of 75,000 plants per acre appeared to be the correct numbers for the deep, rich alluvial soils of St. Joseph and Alexandria, Lofton said.

2014 crops were planted at the same dates and locations as the 2013 study. It often takes three, four, or five cycles of research to gather significant data, said AgCenter agronomist Rick Mascagni.

One of Mascagni’s projects is studying the potential for ratoon crops in grain sorghum. Trials were conducted at the Rice Research Station in Crowley, Dean Lee Research Station and the Northeast Research Station.

Similar tests were conducted at the same sites in 2013. The best ratoon crop was at the Northeast Research Station, but an influx of blackbirds heavily damaged the excellent crop. The fungal disease anthracnose, brought about by high humidity, also had an effect on the crops, particularly at the south Louisiana sites.

To further evaluate the disease component, the trials were duplicated at each location. The fungicide Quilt was applied to one trial, while another had no fungicide treatment. Insecticides are being applied when needed on all the trials. Researchers will gather data on yield for the main crop and the ratoon crop, while giving disease ratings and determining the influence of disease on the crops.

Whatever disease is in the first crop can carry over to the ratoon crop, “You want to go into the ratoon with a healthy crop. We are trying to maximize yield for both crops by managing the needed inputs,” Mascagni said.

This year, researchers are analyzing the most effective chemicals to manage populations of insects like headworms and sorghum midge, but the focus shifted to battle a new enemy—sugarcane aphids. These insects became a major problem—the first time they have ever been a pest in sorghum in the U.S., said AgCenter entomologist David Kerns.

“Some farmers lost 100 percent of their crops in 2013, and the norm was a 50 percent loss,” he said.

2014 Soybean and Grain Research and Promotion Board Funded Projects

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<th>Project Title</th>
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<td>Electrically-Charged Fungicide Adjuvant, Cristina Sabliov Communications</td>
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<td>2014 Louisiana Soybean &amp; Grain Research &amp; Promotion Board Report, Frankie Gould</td>
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<td>Entomology</td>
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<td>Crop Pathology &amp; Crop Physiology</td>
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<td>Using Molecular Biology To Control Soybean Diseases: Cercospora Leaf Blight And Rust, Zhi-Yuan Chen</td>
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<td>Epiphytic Bacteria And/Or Their Metabolites For Control Of Soybean Diseases, David Kerns and Claude Thibodeaux</td>
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Surveying Louisiana Soybeans for Soybean Vein Necrosis and Soybean Mottle, Bolognino Valverde

Dean Lee Research Station | $189,843 |

Agronomic Research and Extension To Improve Soybean Production In Louisiana, Ronald Levy

Soybean And Grain On-Farm Demonstration Program - 2013, Ronald Levy

Corn On-Farm Demonstration Program - 2014, Dan Fromme

Reevaluation Of Threecornered Alfalfa Hopper Pest Status In Louisiana Soybeans, Julien Beuzelin

Soybean Weed Management Systems In Louisiana, Daniel Stephenson

Weed Management Systems For Feed Grain Crops In Louisiana, Daniel Stephenson

Macon Ridge Research Station | $309,776 |

Evaluation Of Management Practices and Varieties Selection For Improved Soybean Seed Quality, Josh Lofton

Improving Management of Double Crop Soybean Production, Josh Lofton

Research And Extension Program For Grain Sorghum Production In Louisiana, Josh Lofton

Timing Of Irrigation Initiation And Termination On Soybean Yield In Northeast Louisiana, Josh Lofton

Evaluate The Effects Of Periods Of Saturaton On Nitrogen Loss And Corn Growth, Josh Lofton

Refining Field Corn And Grain Sorghum Insect Pest Management Strategies, David Kerns

Optimizing Chemical Control Strategies For Louisiana Soybean Pest, David Kerns

Evaluation Of Cercospora Leaf Blight And Purple Seed Sain In Louisiana, Trey Price

Evasion Of Soybean Disease And Fungicides For Disease Management In Northeast Louisiana, Trey Price

Managing Disease In Louisiana Corn, Trey Price

Whipweed Disease Management In Louisiana, Trey Price

Northeast Research Station | $186,677 |

In-Field Evaluation Of Soil Fertility For Soybean And Corn, Beatriz Haggar

Optimization of Potassium Fertilization For Corn and Soybean Production, Beatriz Haggar

Cultural Practices That Influence Corn Yield Performance In Northeast Louisiana, Henry Mascagni

Cultural Practices That Influence Grain Sorghum Yield Performance, Henry Mascagni

Soybean Weed Control Research In Northeast Louisiana, Donnie Miller

Development Of Weed Management Programs In Northeast Louisiana Corn and Grain Sorghum, Donnie Miller

Red River Research Station | $262,113 |

Soybean Breeding And Variety Development, Blair Buckley

Rice Research Station | $647,710 |

Evaluation Of Soybean Culturial Practices In Southwest Louisiana, Dustin Harrell

New Projects

Dean Lee Research Station | $23,000 |

Development Of Methods Assessing The Effects Of Drought and Salt Stress on Soybean Insect Management, Julien Beuzelin

Development Of Technologies To Reduce Off-target Spray Drift In Soybeans, Randy Price

Variety Evaluation and Wheat Disease Management in Central LA, Boyd Padgett

Entomology | $73,830 |

Integrated Management of Changing Soybean Pest Complexes, Jeff Davis

Soybean Looper Population Growth Rates on Herbicide Resistant Weeds, Jeff Davis

School of Plant, Environmental and Soil Sciences | $20,625 |

Molecular Genetics Studies for Development of DNA-Based Markers to Complement Wheat Breeding, Nanjan Basish

Grand Total 2014 Funding

<table>
<thead>
<tr>
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On-farm verification programs provide answers

On-farm demonstration programs have been around in Louisiana since Seaman A. Knapp’s rice demonstration plots in southwest Louisiana more than 100 years ago. Today that tradition continues as AgCenter agents plant verification fields for crops such as rice, cotton and corn across the state to determine which varieties and hybrids perform best.

“These on-farm demonstrations are real-world teaching tools for agents, consultants, dealers and agribusiness reps that allow them to better serve Louisiana’s agricultural base,” said AgCenter soybean specialist Ronnie Levy.

“Although the objective of these on-farm demonstrations is to demonstrate to clientele that research the AgCenter produces is valid, we often learn additional facts related to the research objectives because of the large numbers of demonstrations and the varying geographic locations in which they are conducted,” Levy said.

In addition to on-farm yield trials, the AgCenter research stations test commercial corn, soybean, sorghum, wheat and oat hybrids and varieties entered in the state yield trials by private seed companies.

“This year, we had trials at the Central, Dean Lee, Iberia, Macon Ridge, Northeast, Red River and Rice research stations,” said Boyd Padgett, director of the AgCenter Central Region. “The results are published for each crop every year to allow growers to select the hybrids or varieties that are adapted to their individual farms.”

Soybeans

On-farm demonstrations play a critical role in showing that new soybean technology generated by the LSU AgCenter is applicable to the farm and can increase profits.

Besides evaluating yield, these demonstrations may include fertilizer rates and timings, use of lime, planting dates and use of new equipment. Levy said they also look at disease and nematode control, insect control, irrigation methods, tillage methods and harvesting techniques among other practices.

Demonstrations are also used to address issues that develop during the production year.

“Having the flexibility to design demonstrations to answer critical questions in a timely manner is invaluable to producers,” Levy said.

Corn

Across the state, state corn specialist Dan Fromme has 15 sites that include from 12-16 corn hybrids. Six seed companies are represented in the trials.

The primary traits Fromme is evaluating are yield, bushel weight, disease susceptibility and insect resistance. Other issues include soil types and irrigation.

Fromme expects to have his data from the verification program available in September. Results will be posted on the AgCenter website, www.Isuagcenter.com, and will be presented at winter grower meetings.

Wheat

The AgCenter conducted core block wheat variety trials on farms in Franklin, Tensas, Caddo, St. Landry, Point Coupee and Beauregard parishes.

“In the past, wheat work was focused in the southern regions, but we made an effort to get all four corners of the state covered,” said Josh Lofton, LSU AgCenter agronomist at the Macon Ridge Research Station.

“These trials allow producers to evaluate how new varieties perform in their production environment,” Padgett said.

Yield data are collected on each variety, as well as disease reactions when diseases are present, he said. Diseases present in some trials this year included bacterial streak, leaf rust, stripe rust and scab.

Researchers are evaluating results from harvesting 12-17 wheat varieties.

Grain Sorghum

Each year, the top issue for grain sorghum may be determining the best hybrids. The 2014 sorghum trials were located at the Rice Research Station in Crowley, Dean Lee Research Station in Alexandria, the Northeast Research Station in St. Joseph, the Central Research Station in Baton Rouge, the Macon Ridge Research Station in Winnboro and the Red River Research Station in Shreveport.

“The fungicide component is the big change this year from last,” said AgCenter agronomist Rick Mascagni. Another objective of the research is evaluating optimum nitrogen rates on alluvial clay soils. “We want to ensure our recommended application rates are correct for new hybrids,” Mascagni said.

Grain sorghum demonstration plots were grown in Concordia, St. Landry and Avoyelles parishes this year with seven hybrids on plots ranging from 7-14 acres, according to AgCenter agronomist Josh Lofton.

Tobie Blanchard, Craig Gautreaux and Randy LaBauve

Researchers look for biological controls for aflatoxin

Of all the issues farmers must contend with, aflatoxin-contaminated grain can be one of the most costly at harvest. Several strains of Aspergillus fungus produce aflatoxins, which are complex, harmful pathogens that attack several crops, including field corn. LSU AgCenter researchers are working to develop biological controls for these aflatoxin-producing fungi.

That is not a simple task, according to AgCenter plant pathologist Ken Damann. He has been studying ways to manage aflatoxins since 1996, when there was a severe outbreak in Louisiana.

“Aspergillus flavus is a soil-borne fungus that is ubiquitous,” Damann said. “The fungus itself is not bad, but sometimes it makes secondary metabolites referred to as aflatoxins that have health concerns for people if consumed.”

Some strains of the A. flavus fungus produce aflatoxins, but others do not. Those variances make aflatoxins difficult to understand, but they could also be key to control.

Damann said some strains of A. flavus are actually nontoxic and can stop toxic strains from producing aflatoxins when the two infect the same grain. While that mechanism represents promising potential for biological control, there are a few catches.

“Only certain nontoxic strains inhibit certain toxic ones,” Damann said. “When we deploy nontoxic strains in the field, we need mixes of these strains of differing specificities.”

To identify which strains effectively prevent the production of aflatoxins, Damann and Zhi-Yuan Chen, AgCenter plant biologist, are sorting through the multitude of A. flavus strains to determine which are the “bad guys.”

Chen said some strains cause visible fungal growth on infected seeds but do not produce aflatoxins, while in other cases, there is no fungal growth but aflatoxins are still present.

Aflatoxins are a big concern for corn farmers, Chen said, because the FDA regulates how much aflatoxin can be in corn. If the concentrations are too much, the grain cannot be sold.

Damann said some aflatoxin-inhibiting strains work on field corn and not other plants, or vice-versa. Because aflatoxin contamination is such a major issue for corn, the strains used in potential biocontrols must be infectious in corn.

Damann is also looking at a bacterium found in rice that inhibits aflatoxins. Eventually, he said, it could be used in conjunction with nontoxic A. flavus strains in a spray to reduce aflatoxins in grain.

“We want to have not just one strain of these organisms for biocontrol, but multiple ones that cover the spectrum of damaging A. flavus strains in the field,” Damann said.

Some of the funding for Damann and Chen’s work comes through the Aflatoxin Mitigation Center for Excellence, which is administered by the National Corn Growers Association. Other funding is from the Louisiana Soybean and Grain Research and Promotion Board. Olivia McClure

Zhi-Yuan Chen, AgCenter plant biologist, sorts through the multitude of A. flavus strains to determine which are toxic and nontoxic. (Photo by Olivia McClure)
Scientists look to molecular markers to speed wheat breeding

Many wheat varieties developed by seed companies aren’t suited for Louisiana because the warm, humid Gulf South conditions encourage disease development. But LSU AgCenter wheat breeder Steve Harrison and his team are working to ensure that Southern farmers have varieties well-adapted to this region. Harrison said wheat breeding is a long-term commitment taking up to 10 years from the time a cross is made until a new variety can be released. “It involves screening tens of thousands of breeding lines in early generations, filtering out the best ones and genetically purifying them through self-pollination,” Harrison said. “Then in six or seven years we conduct yield trials at multiple locations.”

Harrison is working with AgCenter molecular biologist Niranjan Baisak to speed up the wheat breeding process by developing and using molecular markers to identify desirable genes in potential wheat varieties. “Molecular markers are like hundreds of milestones on the road,” Baisak said. “If we know we have a given molecular marker is linked to a gene for a particular trait of interest, then we can select lines containing the gene by using that particular marker.”

Baisak said this saves time, especially with traits difficult or expensive to screen for in the field. “Without molecular markers, screening for disease resistance requires waiting for the disease to show up in the field,” he said. Harrison said screening for herbicide resistance requires growing a large number of breeding lines in the field and applying differential rates of herbicide to them. The markers are not reliant on environmental conditions to display resistance, and DNA can be extracted from a single plant a few days after it germinates in the lab or greenhouse.

Baisak is developing molecular markers associated with tolerance to the herbicide Sencor. This will allow breeding lines and varieties to be quickly screened for the presence of genes coding for Sencor tolerance. Harrison said Sencor is an inexpensive herbicide effective against weeds, but it can damage some wheat varieties. “We can take leaf tissue, do a lab assay and see whether it has the gene or genes for resistance present in the variety,” Harrison said. This method is also being used to determine which lines are resistant to the disease stripe rust.

AgCenter plant pathologist Trey Price evaluates experimental and commercial fungicides in field trials to see which ones work best. “We rate plots several times to get an idea of disease severity and compare across treatments, then look at yields,” Price said. Price and Boyd Padgett, plant pathologist and director for the AgCenter’s Central Region, are working with the wheat team on a research project aimed at finding resistance to the disease, fusarium head blight, or scab. The AgCenter has several misted, inoculated scab nurseries each year to evaluate disease severity of breeding lines and varieties under high disease pressure. Price and Padgett help produce inoculum for the nurseries and evaluate lines in the field. Price said scab is generally a problem in all wheat-growing areas in the country. It is more of a problem in Louisiana in areas that also grow rice.

Wheat specialist Josh Lofton coordinates educational and outreach programs for wheat producers. He is looking at the growth and evaluate lines in the field. “Without molecular markers, screening for disease resistance requires waiting for the disease to show up in the field,” he said. Harrison said screening for herbicide resistance requires growing a large number of breeding lines in the field and applying differential rates of herbicide to them. The markers are not reliant on environmental conditions to display resistance, and DNA can be extracted from a single plant a few days after it germinates in the lab or greenhouse.

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