


2008 LOUISIANA

Soybean & Grain

RESEARCH & PROMOTION BOARD REPORT


Better wheat prices lead to comeback

Amber waves of grain are becoming more common in Louisiana as better prices have led wheat to make a dramatic comeback.

Last year the state's farmers harvested 228,000 acres of wheat, up from 110,000 acres in 2006. For 2008, the total increased to approximately 400,000 acres, according to LSU AgCenter wheat breeder Dr. Steve Harrison. He said the 70 percent jump in the past two years can be attributed to the price increasing from the range of $3 a bushel to $7 per bushel.

The state's record acreage total was approximately 500,000 in 1985, Harrison recalled, and that also reflected higher prices.

After prices fell in the mid-1980s, however, wheat was considered a secondary crop in Louisiana, Harrison said.

"It's been treated as a redheaded stepchild," he said, although the LSU AgCenter expert stressed that Louisiana wheat farmers can compete with their counterparts to the north.

"Our yields compare favorably to any part of the country, and most of our acreage is double-cropped," he said.

The latest Louisiana Summary of Agriculture and Natural Resources from the LSU AgCenter shows the state's 613 wheat farmers had an average yield of 59 bushels per acre in 2007. According to statistics from the U.S. Department of Agriculture, the national average wheat yield in 2007 was 42 bushels an acre.

Wheat is a low-input crop that could cost $100 to $220 an acre to produce, Harrison said, adding that wheat has low seed and chemical costs and relatively low nitrogen requirements.

A wheat crop provides cash flow in May and June when growers are paying for inputs for summer crops. "Most years it's a very good crop," Harrison said.

Photo by Bruce Schultz

Louisiana farmers planted approximately 400,000 acres of wheat in 2008 – almost four times what was planted just two years earlier. Better prices have led to the crop's comeback.

As a wheat breeder, Harrison works to develop improved varieties. That means he has to consider a wide range of traits, including disease and insect resistance and good yields.

Harrison participates in SunGrains, a consortium that includes the LSU AgCenter, Clemson University, the University of Florida, North Carolina State University and the University of Georgia. The group collaborates on variety development for the south-

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Multidisciplinary approach taken in studies of 'green bean' problems

Checkoff funds for this project: $30,000

LSU AgCenter researchers are using a multidisciplinary approach to study soybean green plant problems across Louisiana.

In recent years, the frequency of plants retaining green leaves, green stems and green pods in fields of mature soybeans has increased significantly.

Research scientists and soybean production specialists believe these symptoms, commonly called "green bean syndrome" or "green stem syndrome," can be induced by a number of what they call abiotic and biotic factors. But there is no definitive research demonstrating these effects within current production systems, said LSU AgCenter entomologist Dr. Rogers Leonard.

Leonard is studying the problem along with LSU AgCenter weed scientist Dr. Jim Griffin, agronomist Dr. Don Boquet, plant pathologists Dr. Boyd Padgett and Dr. Ray Schneider and fellow entomologist Dr. Jeff Davis.

Schneider called the disorder "one of the most serious afflictions to plague the soybean industry," and the researchers say learning more about the exact cause is the key to moving toward the solution.

Green stem syndrome is said to occur when stems remain green and moist after the pods mature. The condition can result in delayed harvest, reduced harvest speed and contamination of harvested seed with green plant material. Mature pods that remain in the field during wet conditions can cause the seed to develop secondary problems or shatter onto the ground.

"The exact cause of the syndrome is unknown but has been attributed to fungal and viral infections, insect feeding that results in delayed maturation and in some cases drought," Leonard said.

The end result of green plants in a field of mature soybeans ready for harvest is a direct yield loss, reduced seed quality and reduced harvest efficiency, according to the experts, who say it also occasionally results in increased use of harvest aids.

Leonard and other LSU AgCenter scientists say their initial research project is needed to clearly reveal the causes that may be associated with this late-season soybean malady.

"Until we are able to clearly define the problem, it will be difficult to recommend a catch-all solution," Leonard said. "Because so many factors at one time or another have been associated with some of the green bean symptomology, this appears to be a complex series of interactions that are not well understood."

That's why these LSU AgCenter researchers are taking a team-oriented approach and are coordinating and summarizing results from several similar studies across Louisiana.

The current experiments at the LSU AgCenter's Macon Ridge, Dean Lee and Central research stations are examining the effects of cultivar (Roundup Ready and conventional), plant stress (water deficiency), insects (stink bugs) and fungicide treatments on the incidence of green leaves, green stems and green pods. The core test is with 12 varieties, including two that are older lines developed prior to the Roundup Ready ones.

At the end of the season the various experimental plots will be evaluated for the frequencies of plants exhibiting green leaves, green stems and green pod. All plots will be harvested, and seed yield and quality will be compared to adjacent plants in the plots that are not showing the symptoms.

"For Louisiana's soybean industry to maintain and even improve production, we need to develop a better understanding of these late-season disorders and determine their effects on soybean yield and quality," Leonard said.

"'Green bean' problems encompass a wide range of symptomology and can be in spots or whole fields – but in some cases can cause complete yield loss," he said, adding, "We hope to associate individual treatments in the study with specific symptoms and then figure out what is going on at the farm level."–**Mary Ann Van Osdell**

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From the
Louisiana Soybean and Grain Research and Promotion Board

The Louisiana Soybean and Grain Research and Promotion Board focuses your checkoff dollars on projects that address Louisiana's most important production and marketing issues.

The board administers both the national soybean checkoff and Louisiana's wheat and corn checkoff. In addition, although the state checkoff on grain sorghum was suspended this year because of the new national checkoff, the board will be working with the new national grain sorghum checkoff program to obtain funds for research specific to Louisiana's needs.

Your checkoff dollars make it possible to fund continuing research that addresses production problems faced in Louisiana. This report describes some of the activities funded by your checkoff dollars. A lot of effort is focused on addressing diseases, insects and other agronomic issues that most adversely affect yields. Specific projects are addressing diseases in soybeans, aflatoxin in corn, breeding new varieties of wheat and soybeans, improving the agronomic practices used in Louisiana and much more.

Although research funding is the major focus of the board, market development activities also are funded with the United Soybean Board, National Corn Growers Association, U.S. Grains Council and the National Grain Sorghum Producers Association. At the national level, investments in foreign market development projects and new uses are paying off. There is strong demand from both traditional export and domestic markets while the relatively new market for renewable fuels continues to grow and has become an important market for growers, as well as a reliable source of fuel for our country.

Your checkoff dollars make these and many more efforts possible. On behalf of the Board, I would like to thank you for your support of this program.

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

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Researchers say
Don't plant soybeans too early

Louisiana soybean growers have become increasingly interested in early planting, and LSU AgCenter researchers have been evaluating how different cultural practices affect soybean performance.

Three LSU AgCenter scientists have been looking at optimal planting dates for soybeans in maturity groups III, IV, V and VI over the past few years under grants funded by the Louisiana Soybean and Grain Research and Promotion Board.

"Optimal planting date can be influenced by production practices that include both row spacing and variety," said Dr. Ernie Clawson, who conducts research at the Northeast Research Station in St. Joseph. "Row spacing effects may occur because day length or weather can limit soybean growth when planted early – making canopy closure and full utilization of resources unlikely in wide rows."

Photo by Bruce Schultz

LSU AgCenter researcher Dr. Ernie Clawson is among those looking for optimal planting dates for soybeans in various maturity groups. Researchers across the state also are studying how various cultural practices affect soybean performance.

Clawson says different varieties in the same maturity group can respond differently to planting date or row spacing because of growth potential, critical day length or other factors.

Soybeans flower in response to day length and temperature. The earlier varieties bloom when days are long and nights are short, and the later-maturing varieties bloom during relatively shorter days and longer nights. Days are longer during the summer, so early-maturing soybeans will begin to flower then and are ready for harvest earlier in the year.

Clawson, whose study comparing planting dates and row spacing is concluding with third-year results in 2008, says narrow rows had yield advantages in 2006 but much less in 2007.

"The 2006 data suggest that the earliest optimal planting date was in early April for Group III and Group IV beans in narrow rows and mid-April for the same maturity groups in wide rows," Clawson said.

"For most varieties in each maturity group, late March was the earliest optimal or near-optimal planting date in 2007 – regardless of row spacing," he added, noting that Cercospora may have limited yields of soybeans planted at later dates, especially in the Group V variety.

In both years, the single Group V variety responded well to late-March planting dates in both narrow and wide rows, he said.

Dr. Don Boquet at the Macon Ridge Research Station and Dr. Steve Moore at the Dean Lee Research Station evaluated Group III through Group VI varieties at eight planting dates from March 15 to May 26 in narrow and wide rows.

"In 2007, row spacing had no effect on yield at the mid-March and late-May planting dates, but with early-April through mid-May planting dates, average yield in the 16-inch spacing was 6 bushels per acre higher than in the 40-inch row spacing," Boquet said.

In addition, Boquet said soybeans planted in mid-March yielded 50 to 60 percent less than soybeans planted in late March and early April.

Checkoff funds for these projects: $62,700

"Farmers should be very cautious about planting soybeans in Northeast Louisiana before late March, regardless of maturity group," he advised.

Boquet said it is becoming clear that planting dates for soybeans have changed dramatically from 10 years ago. The researchers attribute this to changes in genetics in varieties that respond better to early planting.

The LSU AgCenter scientists also said difficult-to-control insect and disease problems have lowered the yield potential and increased the risk for soybeans that reach maturity later than mid-September.

"The yields of Group V varieties at early planting dates in this study are of particular note," Boquet said. "It represents a complete reversal from responses of the past when varieties in this maturity group were genetically disposed to extreme dwarfing under the short day conditions in March and April."

Factors other than yield also need to be considered in selecting varieties to plant, researchers advised.

"At the present, I do not know of a time when planting Group III varieties will result in yield improvement over another maturity group," Moore said.

"The possible significant place for Group III varieties in Louisiana may be if Asian soybean rust ever develops into a significant production issue," Moore added. "Then the earliness afforded by Group III varieties might help escape that disease."

Boquet said seed quality at harvest also was affected by planting date.

"The best quality seed was from the mid-April planting date," he said, adding, "Increased plant height and improved seed quality are additional reasons to plant in April rather than March. –**Rick Bogren**

21st century soil tests *require new calibrations*

Photo by Jennifer Ator

LSU AgCenter researchers Dr. Jim Wang and Dr. Brenda Tubana are working on a project to calibrate the results of more sophisticated soil testing methods and the accompanying fertilizer recommendations to the variety of soils in the state. Their work includes plant/soil analyses in the lab and field tests at the LSU AgCenter's Central Research Station.

Fertilizer recommendations for Louisiana crops are being improved with the adoption of new soil testing methods by the LSU AgCenter's soils lab, according to Dr. Jim Wang.

Wang, a soil chemist, said the new, multi-element method is an improvement over older practices of testing for each soil nutrient individually. The challenge, though, is to calibrate the results from the new tests with the state's soils.

"Louisiana has so many different soils and so many different crops. It took a long time to move from the older tests to the new method," Wang said. "We have to redesign tests for major soils and major crops."

To make the transition, Wang began by using a statistical method to adapt a new database of information accumulated in prior years.

"We want to validate the design and new calibration to be able to make the best recommendations based on these new testing methods," he said.

To help with the project, Wang is working with Dr. Brenda Tubana, whose area of expertise is soil fertility.

Tubana has been gathering samples of different soil types and testing them to develop comparisons with results from older data used to develop initial fertilizer recommendations that are now decades old.

For instance, Wang said, tests for phosphorus have shown that on acid soils, 30 parts per million is the "critical level" for corn production. Phosphorus levels below that reduce the soil's yield potential.

Acidic soils – those that have a low pH – can be improved with the application of agricultural lime. "Liming can promote potassium availability," Wang said.

Wang said growers can approach fertilizer use in two ways. The "sufficiency philosophy" says fertilizer should be applied only in the amount necessary to meet the plants' requirements for the current season while the "maintenance/buildup" idea, which currently is being evaluated, provides soil fertility levels that can support various levels of production according to the variables that occur during any particular year.

"This approach, along with the soil test, will give producers a choice," Wang said.

For the current year, Wang and Tubana are using statistics to calibrate the old fertilizer recommendations with the new testing methods, and they're improving a soil-nutrient index system that will give growers nutrient level ratings so they can assess the fertility of their soils.

"We want to include yield potential along with soil tests in determining crop fertilizer requirements," Tubana said.

In addition to field studies, Tubana has gathered large samples of major soil types in Louisiana and used them in greenhouse research. Each soil type has been put in pots planted with corn to evaluate plant response to fertility levels in the soils.

The researchers hope to move to fertilizer recommendations based more on new research than on statistical relationships with the old database.

In addition to Wang and Tubana, other scientists contributing to this research include Dr. Rick Mascagni, Dr. Don Boquet, Dr. Ernie Clawson, Dr. Dustin Harrell and Dr. J Stevens.–**Rick Bogren**

Checkoff funds for this project: $36,077

Combating aflatoxin hugely significant this season

With dry conditions this season, ways to combat aflatoxin in corn are taking on huge significance.

LSU AgCenter plant breeder Dr. Steve Moore continues to look for ways to combat aflatoxin in corn, especially in evaluating lines for resistance.

He has planted more than 1,500 corn lines obtained from the North American Plant Introduction Station in Ames, Iowa, over a number of years at the LSU AgCenter's Dean Lee Research Station south of Alexandria. His work, which is funded in part by a grant from the Louisiana Soybean and Grain Research and Promotion Board, is evaluating those lines for resistance to aflatoxin biosynthesis.

Aflatoxin is a byproduct of *Aspergillus flavus*, a naturally occurring fungus that is found in soil across the southeastern United States and normally is relatively harmless until conditions – such as heat and drought – are right for aflatoxin biosynthesis.

Aflatoxin is a cancer-causing toxin, Moore said.

In his studies, corn ears are inoculated with *Aspergillus flavus* after silking. After harvest, kernels are ground to a meal and sent to the U.S. Department of Agriculture's lab at Stoneville, Miss., for aflatoxin analyses.

From the lines he has evaluated, Moore has selected 34 that have shown relatively low aflatoxin production.

"We hope at least one of the lines will show better resistance than the ones currently available to growers," he said. "If so, we will consider the project a big success."

Moore is working in cooperation with research associates Mildred Deloach and Jim Hayes and researcher Dr. Rick Mascagni – with trials being replicated at the LSU AgCenter's Northeast Research Station in St. Joseph and its Red River Research Station in Bossier City.

Moore said the research objective is to incorporate new genes that provide superior resistance into commercial corn cultivars.

Aflatoxin is a major production concern for corn growers in the region, and although resistant lines have been identified, resistance has not been transferred into commercially useful hybrids at the desired level of performance, Moore stressed.

Photographer Unknown

LSU AgCenter plant breeder Dr. Steve Moore checks corn at a winter nursery in Puerto Rico.

Checkoff funds for this project: $52,000

The last severe aflatoxin outbreak in Louisiana was in 1998 when heat and drought combined to increase the toxin in corn fields.

"If temperatures rise above 95 degrees, we will have to keep an eye on corn this year for aflatoxin contamination, since the crop may already be stressed due to low rainfall," Moore said early this season.

The LSU AgCenter researcher explained that the fungus "loves hot temperatures" and that when conditions are right "it takes off."

But he said a bright spot may be this year's market conditions.

"If aflatoxin does occur, high corn prices hopefully will help growers absorb the cost of perhaps treating the grain," Moore said.

The LSU AgCenter researcher said glufosinate, a key ingredient in Liberty herbicide, may raise the ammonia level in the corn, which breaks down aflatoxin. But results from field research trials are inconsistent.

Corn lines from field research trials should be harvested in August, and results should be available after aflatoxin concentrations are measured at the USDA's Stoneville facility.

Moore hesitates to make predictions, but he said he considers this research to be "exciting and important in that the potential exists to identify new and improved resistance."–**Mary Ann Van Osdell**

Basic and applied research projects target soybean diseases

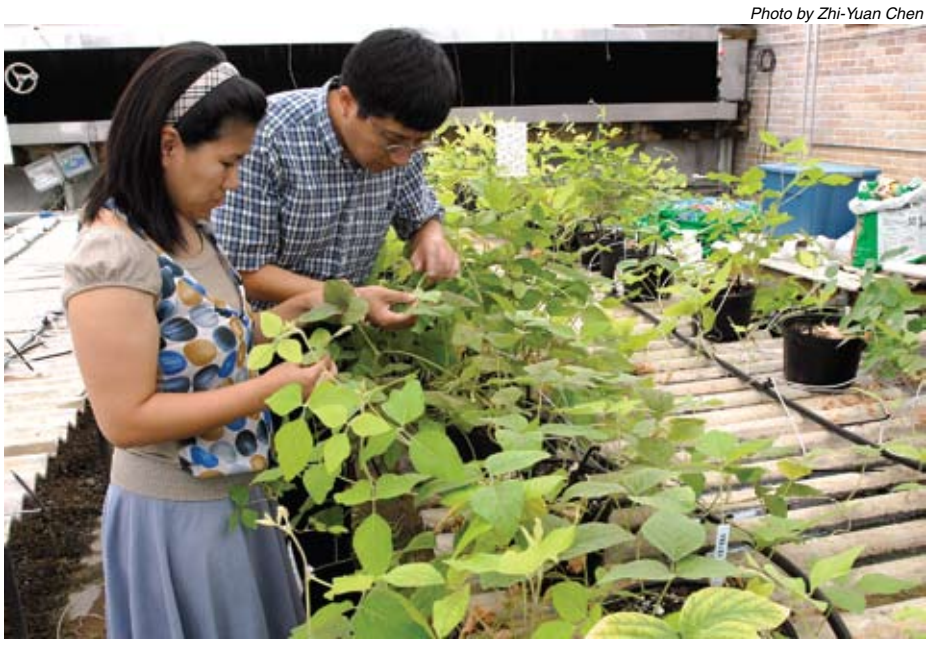
Scientists looking for short-term and long-term solutions

LSU AgCenter researchers continue their quest for short-term and long-term solutions in the battle with soybean diseases – particularly Asian soybean rust.

Scientists are conducting a variety of what are called basic and applied research projects as part of that effort. Basic research lays the fundamental groundwork for beneficial results later on, while applied research can yield positive benefits in a relatively short time.

Four projects funded by the Louisiana Soybean and Grain Research and Promotion Board are led by LSU AgCenter scientists Dr. Ray Schneider, Dr. Zhi Yuan Chen, Dr. Svetlana Oard and Dr. Boyd Padgett. Those projects are looking at the biology and control of major diseases of soybeans, new strategies to control soybean rust, developing genetic resistance to Asian soybean rust and evaluation of soybean cultivars and fungicides in disease management.

Photo by Zhi-Yuan Chen



Soybean germplasm collections with potential resistance to rust disease were screened under greenhouse conditions during the off-season by LSU AgCenter researchers in Dr. Zhi-Yuan Chen's lab. Shown here, Chen and his student Sunjung Park evaluate different soybean lines for levels of resistance two weeks after rust inoculation.

Checkoff funds for these projects: $184,356

Some of the projects involve multistate cooperation or similar projects being conducted by researchers across the soybean-growing regions of the country. For example, Schneider coordinates one of the nationwide screening nurseries for resistance to soybean rust.

The LSU AgCenter expert said that effort probably is "one of the most important" projects he's involved with "because disease resistance will be the most efficacious means of disease control."

Oard, who is in the LSU AgCenter's Department of Veterinary Science, is among those looking for novel genes that can be inserted into soybean varieties to increase disease resistance – particularly resistance to Asian soybean rust.

"We have identified a gene that encodes strong antifungal as well as antibacterial activity," Oard said. "This gene is an excellent candidate for developing soybean lines with stable resistance against Asian soybean rust pathogens."

Known as Purothionin, or PTH for short, the gene is an antimicrobial peptide from the endosperm of wheat seeds.

"PTH presents the potential for an attractive alternative to costly chemicals to develop Asian rust resistance in soybeans," she said, stressing, however, that the work is still in its early stages. "Learning how to make this very potent peptide work in soybeans will take some effort, but the outcome can exceed expectations."

While Oard's work has focused on inserting genes to increase soybean resistance to diseases, the efforts in Chen's lab have focused on understanding how diseases infect plants, determining how plants respond to a disease attack and developing detection methods for infections.

For example, to understand how rust infects soybeans and how hosts respond to the attack, Chen and the scientists working with him have compared protein differences between rust-infected and noninfected soybean leaves. They are studying proteins induced by rust infection to determine whether "increasing the production of these proteins may provide a new approach in disease control."

Another major area of research in Chen's lab has been to develop a reliable method to detect soybean leaf blight disease caused by the fungus *Cercospora kikuchii*. He and Schneider are cooperating in a study to determine how long it takes from the time infection has occurred until symptoms appear.

Schneider's comprehensive research program is focused on a variety of disease-management options and economic considerations – including evaluating fungicides for disease control and developing protocols for their use.

"As a result of such research, recommendations have been developed for Asian soybean rust, pod and stem blight and Cercospora leaf blight, although the latter disease has defied our attempts to find effective disease control measures," Schneider said.

Work on yield-loss and economic models for the major diseases also is progressing "so that producers can make science-based decisions when deciding whether or not to spray a fungicide," he said. Models have been completed for Cercospora leaf blight, frogeye leaf spot and pod and stem blight, but efforts are just beginning on models for Asian soybean rust, he said.

Schneider and one of his graduate students also completed a comprehensive research project recently in which they examined reasons for the widespread occurrence of Cercospora leaf blight lately – and their findings indicated a rapid genetic shift within the pathogen population. "That's very significant, because it means we can expect new virulent strains of the pathogen to arise shortly after resistant varieties are released," he said.

Schneider also is pursuing a research thrust that involves evaluation of "prescription nutritional amendments." For example, during the past two years, Schneider discovered that preplant incorporation of potash delays disease onset and greatly reduces ultimate disease severity with Asian soybean rust and Cercospora leaf blight.

"These diseases are not completely controlled, but severities are reduced to the point that fungicide applications may not be necessary," he said, adding that further studies have looked at the particular elements that may be influential in reducing disease severity.

Padgett is directing his colleagues in applied research projects that primarily involve evaluating fungicides for managing soybean rust.

Some of the objectives involve determining whether triazoles are all-effective for managing rust and whether they are effective on other diseases affecting soybeans; specifically testing current chemistries such as Quadris, Headline and Topsin M on soybean rust; and determining the residual activity of the fungicides.

"Looking at residual activity not only tells us about the potential impact on the environment of these fungicides but also helps determine the number of applications needed," Padgett said.

The researchers also are evaluating the effects of application timing on disease epidemics and yield. "This will help producers time the fungicide applications based on the diseases present or likely to develop," he said.

Although developing more resistant varieties has been a major thrust of research, Padgett points out that current varieties in LSU AgCenter variety tests also are being studied for resistance to plant pathogens.–**Tom Merrill**

Soybean research & verification program PAYS OFF

Checkoff funds for this project: $34,500

Since the Louisiana Soybean Research and Verification Program began in 1994, soybean farmers have been increasing yields and profits by following the recommended practices of the LSU AgCenter.

During the 14 years of the program, more than 120 producers in 20 parishes have participated in helping to verify the LSU AgCenter's research results and recommendations in their fields. In turn, the fields in the program have averaged yields of 43.5 bushels of soybeans per acre while the state average is 30.8 – meaning the program has helped increase yields an average of 13.1 bushels per acre.

Economic analysis conducted as part of the verification program also indicates that from 2000 to 2006 fields enrolled in the verification program generated returns above direct cost of more than $60 per acre higher than returns based on state average yields and costs.

"With higher commodity prices, increased input costs and the disease and insect pressure they face, producers have certainly come to understand that managing soybeans like they have traditionally managed higher-value crops on their farms like cotton and rice will pay dividends," said LSU AgCenter economist Dr. Kurt Guidry. "The soybean verification program has undoubtedly helped to prove this point."

To be considered for the program, a farmer must agree to follow the recommended practices suggested by a team of specialists who carefully study the field before selecting it for the program.

Coordinators look for a soybean field on the farm being considered that has some potential for improvement. It usually is not the poorest or most productive field on the farm – just an average field that has some potential for improvement. The fields currently in the program range in size from 20 to 60 acres.

Once the soybeans are planted on a field that's involved in the verification program, LSU AgCenter experts check the field on a weekly basis, maintain written records of every visit and communicate with the farmer as additional production practices are needed during the growing season. In addition, an LSU AgCenter economist maintains records that are used to calculate the cost of production and obtain the net gain or loss in the field.

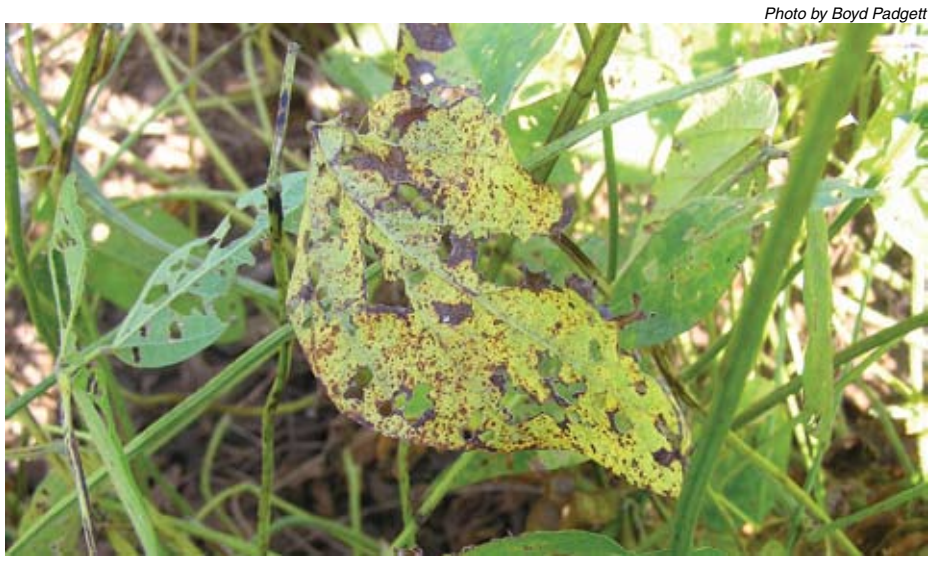
"The Louisiana Soybean Research and Verification Program, other similar programs and favorable growing conditions have helped farmers in the state increase yields and tie or break yield records the past three years," said Robert Ferguson, extension associate and interim coordinator of the Louisiana Soybean Research and Verification program.

By verifying research results in their production fields, farmers also can see – and demonstrate to neighbors – the differences such practices can make toward increasing yields and profits.

"Many times, producers extend the management techniques of the verification fields to other fields on their farms that are not in the program – thus extending the impact of the program," Ferguson said.–**John Chaney**

Combination of monitoring, education, vigilance...and luck keeps Asian soybean rust at bay

Photo by Boyd Padgett



Although Asian soybean rust has done some damage in the state, officials say so far the economic effects haven't been devastating.

Monitoring programs and educational efforts from the LSU AgCenter are among an array of factors that have kept Asian soybean rust from inflicting major harm on the state's crop.

Experts say those factors are joined by vigilance on the part of farmers and luck with weather.

"You can't say it's happened just because of one thing," said LSU AgCenter plant pathologist Dr. Clayton Hollier, who is involved with monitoring and research efforts across the South. "But I'd definitely say a lot of damage has been averted by much better detection and management overall."

The LSU AgCenter has conducted extensive educational efforts aimed at keeping the disease from getting a foothold. It also maintains a network of "sentinel fields" across the state, monitors other areas for signs of the disease and cooperates with other states in monitoring and reporting.

"People have been much more vigilant about scouting for soybean rust and also better about management of all diseases and insects," Hollier said, adding, "So far, those factors, combined with weather conditions that haven't favored disease development when it could do the most damage, have kept soybean rust from doing a great deal of damage."

When Asian soybean rust was first found in the United States in 2004, officials feared it could devastate the U.S. crop – based on what had been seen in South America after the disease migrated there from its origins in Asia and Africa.

"When we first started talking about Asian soybean rust and looking at Brazil and what happened there, we were talking about 10 percent, 20 percent and up to 30 percent yield losses," said LSU AgCenter economist Dr. Kurt Guidry. "So far it hasn't had a big impact on our yields."

Of course, the agricultural economist said that doesn't mean there won't come a year when the disease gets a foothold and causes more problems. It just means so far the disease has developed later in the growing season and that farmers have been successful in managing it.

"One year we had the disease, but I had growers telling me they still got 40 bushels per acre because the crop already had developed when the disease came in," Guidry said.

That type of "luck" has played a factor, but experts say LSU AgCenter research and educational efforts have helped growers realize the importance and the payoffs of better overall crop management.

"Management of the soybean crop and management of soybean diseases are a much bigger issue for our growers today than they were 10 years ago," Hollier said, adding that's the message LSU AgCenter research and extension faculty members have stressed the past few years.

Guidry explained soybeans traditionally had been an "in addition" crop for Louisiana farmers.

"Soybeans generally were not the primary crop in the producer's operation and therefore were not given the same type of focus that the cotton or rice crop, for example, was given," he said. "But now with the advent of soybean rust and with the soybean research and verification program, our producers are much more involved in management of diseases today."

The payoff for farmers from such efforts is pretty clear, according to Hollier and Guidry, who said consistent yield increases, instead of yield losses, for the 2005-2007 growing seasons have meant hundreds of millions of dollars to farmers and the economy.

For example, Guidry pointed out the Louisiana soybean crop has made an economic contribution of more than $626 million to the state's economy over the past three years, according to the Louisiana Summary of Agriculture and Natural Resources from the LSU AgCenter.

"Just not losing 10 percent to 30 percent of that means a lot of money," he said.

Hollier took the point further during a recent briefing about federal spending on agricultural programs and said the $3.2 million in government dollars invested in detection and the release of information have averted $299 million in potential damage for soybean growers across the country.

"When soybean rust first came in, we were concerned that some areas of our state wouldn't be able to grow soybeans at all because of the potential yield reductions from the disease," Guidry said.

"But what we've seen is that it's gotten growers much more involved in management of diseases – not just soybean rust, but all diseases – and that's led to higher yields," he said. "I think the information the LSU AgCenter has put out there about disease management and monitoring, combined with the weather and better prices, has contributed to those increases."–**Tom Merrill**

Keeping pesticides on target goal of research

Checkoff funds for this project: $12,500

Getting pesticides to the intended target is the goal of Dr. Roberto Barbosa, LSU AgCenter assistant professor of agricultural and biological engineering.

He said spraying chemicals on soybeans becomes more challenging after the plant canopy develops because "the top canopy acts as an umbrella, preventing the spray from reaching lower parts of the plant."

Barbosa explained insects often hide on the undersides of leaves, and some diseases usually develop from the bottom up.

A higher volume of water can help get the material to the lower parts of the plant, he said, even though it means the chemical is more diluted. A 10-gallon-per-acre application rate delivers twice the amount of water when compared to a 5-gallon-per-acre rate, but the chemical rate should be the same.

"What we are finding with aerial and ground application is that increasing application rate increases the chances of the product getting to the bottom of the canopy," he said of his research that has been funded in part by a grant from the Louisiana Soybean and Grain Research and Promotion Board.

Nozzle type also will affect canopy penetration, he said.

Systemic chemicals such as glyphosate can be applied with air induction nozzles. These nozzles produce large droplets (larger than 400 microns) and are very good at preventing drift, Barbosa said. But they do a poor job in breaking up the spray.

Nozzles producing medium-sized droplets (300 microns) are needed for contact chemicals, he said.

Turning to other nozzles that result in smaller droplets, Barbosa said, "These nozzles break the liquid jet thoroughly." The negative side of such breakup, however, is the nozzles produce droplets that are small (less than 150 microns) and prone to drift, he said.

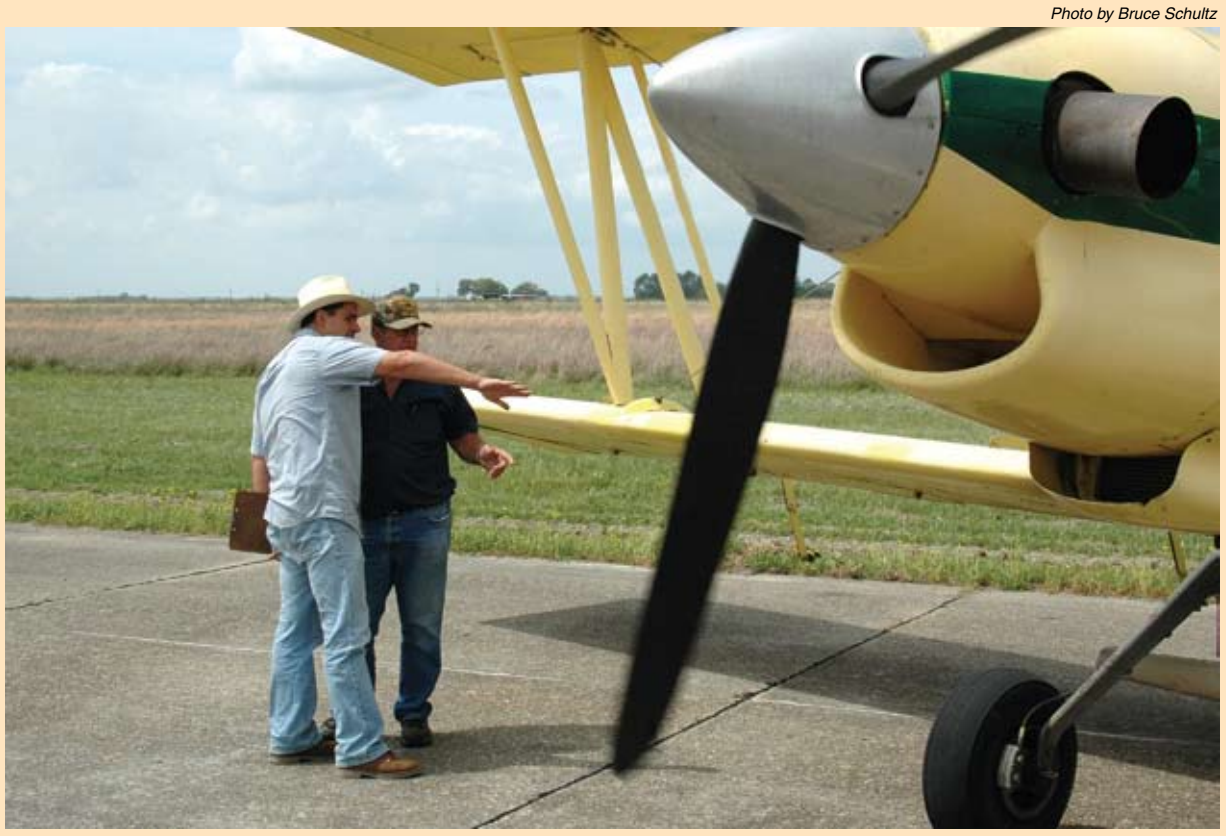
"We should always exercise caution when spraying," the LSU AgCenter researcher added. "Observe meteorological conditions and spray only when winds are calm and there's no sign of a temperature inversion."

Barbosa's work includes helping pesticide applicators who use ground rigs and aircraft to calibrate their spray equipment. "We do that for liquids and solids," Barbosa said.

He travels around the state with a mobile lab to analyze spray patterns and help make sure nozzles are working properly and providing an even spray pattern.

"The best efficiency comes from doing a task one time, which can be done if you have your equipment in order and get the product in the field on a timely basis," he said.–**Bruce Schultz**

Photo by Bruce Schultz



Dr. Roberto Barbosa advises a pilot about adjustments to be made on an airplane to achieve more efficient distribution of pesticides.

Soybean breeding program focuses on disease resistance

One of the main focuses of the LSU AgCenter's soybean breeding program is to develop soybean varieties with resistance to Cercospora leaf blight.

This late-season disease currently is the most damaging disease to soybeans in Louisiana, according to Dr. Blair Buckley, principal investigator on a project funded by the Louisiana Soybean and Grain Research and Promotion Board and a plant breeder with the LSU AgCenter.

The disease is recognized by symptoms of purplish-bronze leaves in the upper plant canopy. Cercospora also contributes to green stem syndrome in which stems remain green after pods and seeds mature.

"This necessitates the use of a harvest aid (desiccant) prior to harvest," Buckley said, adding, "Unfortunately, varieties being grown now are not strongly resistant to Cercospora, and fungicides have not been completely effective against the disease."

Disease-resistant varieties would reduce the need for fungicide applications, Buckley stressed.

Photo by Mary Ann Van Osdell

LSU AgCenter plant breeder Dr. Blair Buckley evaluates soybean plants at the Red River Research Station that are involved in his work to develop more disease-resistant varieties.

In Buckley's studies, older soybean varieties with some resistance are crossed with good-yielding varieties possessing other desirable traits, he explained.

Crosses are made by removing the anthers (male flower part containing pollen) from flowers of one parent and pollinating those flowers with pollen from the other parent involved in the cross-breeding. Seeds from the "crosses" are then collected and planted to produce the first generation of new plants.

These plants are in turn harvested to produce seed for the second generation of plants. Screening and evaluation for disease resistance and many other traits begin in this second generation, known as F2 plants.

Promising plant lines from screening are advanced to the next generation for continued evaluation, Buckley said.

This season, 140 third-generation lines (known as F3 lines) are being evaluated in the field for reaction to Cercospora and for important agronomic traits. Selection for disease resistance also will be conducted from another 28 F2 populations, Buckley said.

Then evaluation for yield can begin with plants that advance through the studies to the fourth or fifth generation, he said.–**Mary Ann Van Osdell**

Checkoff funds for this project: $26,032

2008-2009 Louisiana Soybean and Grain Board Funded Projects

The Louisiana Soybean and Grain Research and Promotion Board funded these projects in various LSU AgCenter departments, research stations and regions during the past year. Projects list researchers, total funding and the portions allocated from soybean funding or feed grain funding.

Biological and Ag Engineering

Continuous Microwave Extraction of Soy Isoflavones. Dr. Cristina Sabliov, $19,600 (soybean)

Deposition Efficiency of Pesticide Application. Dr. Roberto Barbosa, $12,500 (soybean)

Grain Quality Monitoring in Temporary Storage Bags. Dr. Roberto Barbosa, $10,000 (feed grain) *

Communications

Louisiana Soybean and Grain Research Report. Frances Gould, $6,500 ($1,000 soybean/$5,500 feed grain)

Entomology

Biology, Distribution and Management of Soybean Insect Pests. Dr. Jeff Davis, $49,700 (soybean)

Emerging Insect Pest Problems in Field Corn and Grain Sorghum. Dr. Fangneng Huang, $19,500 (feed grain)

Evaluation of Corn Borer Damage in Extension Corn Demonstrations. Dr. Jack Baldwin, $4,000 (feed grain)

Food Science

Extraction, Purification and Antioxidant Properties of Soy Isoflavones from Defatted Soy Flakes. Dr. Zhimin Xu, $28,500 (soybean)

Lutein Extraction from Corn Distillers Byproducts. Dr. Jack Losso, $25,000 (feed grain) *

Plant, Environmental and Soil Sciences

Biology and Management of Diseases of Corn. Dr. Clayton Hollier, $10,000 (feed grain) *

Calibrating Soil Tests and Fertilization for Soybean and Grain Crops of Louisiana. Dr. Jim Wang, $36,077 ($11,577 soybean/$24,500 feed grain)

Small Grain Breeding, Variety Development and Testing. Dr. Steve Harrison, $72,000 (feed grain)

Weed Management and Biology Research in Soybeans. Dr. Jim Griffin, $40,000 (soybean)

Plant Pathology and Crop Physiology

Biology and Control of Major Diseases of Soybeans. Dr. Ray Schneider, $80,050 (soybean)

Developing a New Strategy to Control Soybean Rust Disease Through a Proteomics-based Approach. Dr. Zhi-Yuan Chen, $63,400 (soybean)

Identification of Plant Viruses Infecting Soybean and Corn in Louisiana. Dr. Rodrigo Valverde, $5,000 ($2,500 soybean/$2,500 feed grain) *

Managing Mycotoxin Contamination in Louisiana Corn. Dr. Kenneth Damann, $65,000 (feed grain)

Veterinary Science

Developing Soybean Resistance to Asian Rust Pathogen. Dr. Svetlana Oard, $22,800 (soybean)

Dean Lee Research Station

Evaluating Early-season Soybean Varieties in Production in Louisiana. Dr. Steve Moore, $21,000 (soybean)

Louisiana Soybean Verification Program 2008. Dr. David Lanclos/Rob Ferguson, $34,500 (soybean)

Reducing Aflatoxin in Corn. Dr. Steve Moore, $20,000 (feed grain)

Soybean and Grain On-farm Demonstration Program 2008. Dr. David Lanclos/Rob Ferguson, $42,000 ($21,000 soybean/$21,000 feed grain)

Macon Ridge Research Station

Evaluation of Soybean Cultivars and Fungicides for Disease Management in Northeast Louisiana. Dr. Boyd Padgett, $18,106 (soybean)

Evaluating Selected Insecticide Use Strategies in Louisiana Soybean. Dr. Rogers Leonard, $14,500 (soybean)

Managing Production Risks in Irrigated Soybean with Planting Dates, Varieties and Row Spacing. Dr. Donald Boquet, $21,700 (soybean)

Refining Field Corn and Grain Sorghum Insect Pest Management Strategies. Dr. Rogers Leonard, $17,500 (feed grain)

Wheat Disease Management in Louisiana. Dr. Boyd Padgett, $15,659 (feed grain)

Northeast Research Station

Cultural Practices that Influence Corn Yield Performance and Aflatoxin Accumulation. Dr. Rick Mascagni, $32,000 (feed grain)

Cultural Practices that Influence Grain Sorghum Yield Performance. Dr. Rick Mascagni, $12,000 (feed grain)

Evaluation of Systemic Fungicide and Insecticide Wheat Seed Treatments Across Varieties and Planting Dates. Dr. Rick Mascagni, $12,000 (feed grain) *

Feed Grain and Wheat Weed Control Research in Northeast Louisiana. Dr. Billy Williams, $35,000 (feed grain)

Managing Diseases in Louisiana Corn. Dr. Boyd Padgett, $10,056 (feed grain) *

Planting Dale, Row Spacing and Variety Effects on Performance of Maturity Group III, IV and V Soybeans. Dr. Ernie Clawson, $20,000 (soybean)

Soybean Weed Control Research in Northeast Louisiana. Dr. Donnie Miller, $28,000 (soybean)

The Soybean Green Plant Problem – An Evaluation of Possible Influencing Factors. Dr. Rogers Leonard and others, $30,000 (soybean) *

Red River Research Station

Soybean Breeding and Variety Development. Dr. Blair Buckley, $26,032 (soybean)

* New project funded for 2008-2009.

Total Soybean Funding $566,465

Total Feed Grain Funding $413,215

Total Project Funding $979,680

‘Trapping’ borers *helps protect corn crop*

Checkoff funds for this project: $4,000

The two most important corn borer pests are the sugarcane borer and the southwestern corn borer.

LSU AgCenter agents and specialists are using “trapping” technology to track the southwestern corn borer and help prevent major damage to Louisiana’s corn crop.

Dr. Jack Baldwin, an LSU AgCenter entomologist, said the demonstration project designed to evaluate corn borer damage has been conducted each year since 2004. This year pheromone traps were placed in seven fields in three parishes as part of this grant-funded effort.

Baldwin explained that the so-called sugarcane borer infests corn in northeastern Louisiana and south-central Louisiana and is now the predominant corn borer pest in the state. The southwestern corn borer occurs mainly in the upper parishes of Northeast Louisiana and does not have a statewide presence, he said. In addition, the European corn borer occasionally is found in northern Louisiana, but Baldwin said is not a serious problem.

“Numbers have recently declined in parishes where the southwestern corn borer was once a serious problem – probably due to the adoption of Bt corn and other pest management practices,” Baldwin said.

This year traps funded by a $4,000 grant from the Louisiana Soybean and Grain Research and Promotion Board were placed in three fields in East Carroll Parish, two fields in Madison and two in West Carroll. In addition, agents in Franklin and Richland also maintained traps.

“Traps have told us this year that southwestern corn borer populations have been relatively light,” Baldwin said.

In addition to the traps monitoring borer populations, LSU AgCenter faculty members conducted a comparison test of Bt and non-Bt corn at one of the pheromone trap sites.

Corn borer larvae damage corn by boring into the stalk and then boring up and down the stalk. This disrupts the flow of water, nutrients and other elements required to sustain plant growth and develop an ear of corn.

“Damage to the stalk can even sometimes cause plants to lodge,” Baldwin explained, adding that corn plants are most susceptible at and after the tassel/silk (reproductive) stages and that borers can sometimes even bore into the ear while it is developing.

On the other hand, borers are not considered to be very damaging in whorl-stage (pre-tassel) corn, because of low numbers and feeding on the foliage. But there are times when they cause “dead heart” condition – if they feed on the growing point deep in the whorl.

The LSU AgCenter’s pheromone traps are located in parishes considered to be key to determine moth counts and watch for population increases of the southwestern corn borer.

Specialists also provide recommendations on Bt corn varieties, which often are tested in parish corn variety trials. Other recommendations for minimizing damage include early planting, recommended thresholds and insecticides, and post-harvest crop destruction, Baldwin said.

In addition to the demonstrations, LSU AgCenter researchers test Bt technology and other pest management strategies to determine effectiveness against corn borers and other corn pests, and they monitor corn borer populations for early signs of resistance to Bt.

“Bt corn has been planted on 40 percent to 45 percent of total state corn acreage,” Baldwin said regarding the effectiveness and popularity of that pest management technology.

In addition to the problems the pests can create in corn, corn borers also can be a serious pest in grain sorghum, especially if it is planted late, Baldwin said.

“Corn borer moths migrate from corn as it dries down and then migrate to nearby fields that are still susceptible,” he said.–**Tom Merrill**

Healthier, fresher food could result from microwave extraction of isoflavones

Dr. Zhimin Xu is taking what was a relatively useless product and making it a healthful preservative.

Defatted soy flour is a byproduct of producing vegetable oil from soybeans, and until now, it was used only as animal feed – and only in some cases.

“It’s a very low-value waste product,” Xu, a food scientist with the LSU AgCenter, said.

He is working with other LSU AgCenter scientists to extract isoflavones from the soy flour.

With Xu’s research, isoflavones can perform double duty. They have many health benefits, and he has proven they work well as a food preservative.

“People are very concerned about their health, and the isoflavones, which act as an antioxidant, can protect against heart disease and lower cholesterol,” he said.

Xu has discovered a functional way to get them into the average person’s diet. Artificial preservatives are found in foods such as ground meat and sausage to keep those foods fresher longer. Xu says the isoflavones can act as a natural and healthful food preservative.

“The Food and Drug Administration has questioned the safety of artificial food additives, including food preservatives, for long-term consumption.” Xu explained. “Isoflavones can replace the artificial preservatives to keep food fresh.”

Before he could test the viability of isoflavones as a food preservative, Xu had to find an efficient way to extract them from soy flour. As part of the project funded in part by the Louisiana Soybean and Grain Research and Promotion Board, he worked with Dr. Cristina Sabliov and a team of LSU AgCenter researchers that includes Dr. Dorin Bolder, Dr. Marybeth Lima, Sundar Balasubramanian, Akanksha Kanitkar and Beatrice Terigar.

Checkoff funds for these projects: $48,100

Sabliov, a researcher in the LSU AgCenter’s Department of Biological and Agricultural Engineering, has been testing continuous microwave extraction systems as a means of extracting isoflavones from soybeans. Sabliov and colleagues have been working on such a system for several years and recently received exciting results from two different systems they were testing.

Using two different continuous microwave extraction methods, she compared these novel methods with conventional extraction methods – which, in the case of her research, included a water bath to heat the flour-solvent mixture.

The first system used three household microwave units that the Sabliov team specially geared to do batch processing. The units were placed on top of each other, and tubing was inserted through the chambers of the three units to serve as the conduit for the flour-solvent (or extraction) mixture.

“We wanted to see what happens to the extraction yields as the solvent-flour mixture is heated more with the addition of each microwave,” Sabliov said.

Sabliov looked at four different isoflavones that could be extracted from the soy flour and heated them for different lengths of time.

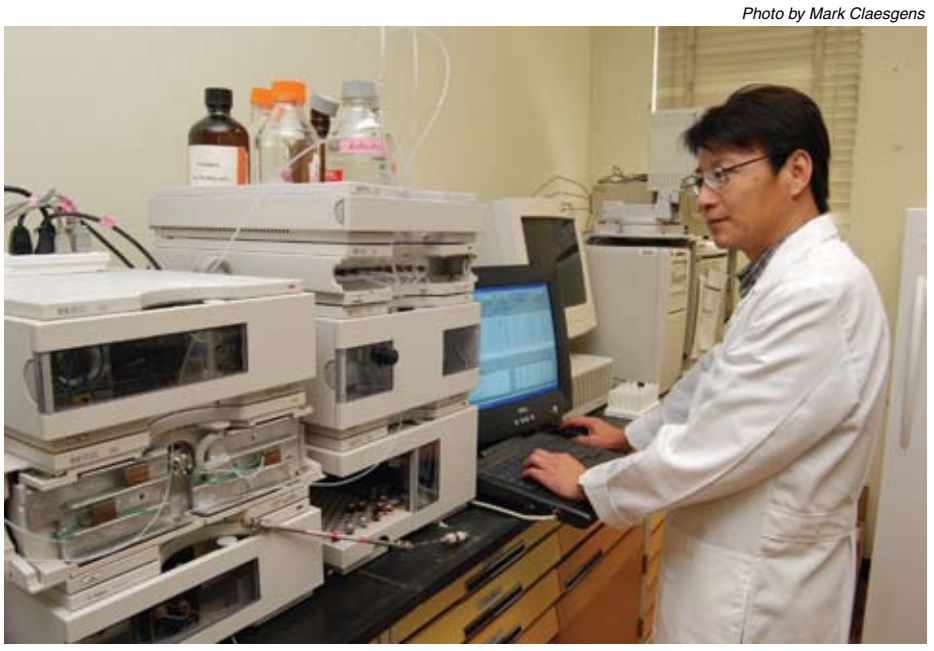
“In all cases we extracted more with microwave extraction in less time than using solvent extraction,” Sabliov explained.

The second system was set up through a batch extractor, which has “better electric field uniformity than a regular microwave system,” Sabliov said, adding that this system allows for more uniform heating and extraction.

With this system, she also found a similar trend to that of the first one – higher extraction in less time with the microwave system.

“It’s fast. It’s easy to use,” Sabliov said. “You can control the temperature, and you don’t have to sit there for hours. It’s minutes. Conventional extraction takes hours, and you have to be there for the duration.”

Photo by Mark Claesgens



LSU AgCenter food scientist Dr. Zhimin Xu, shown here in his lab, is leading research looking at soybean isoflavones as potential food preservatives. In another project, Dr. Cristina Sabliov and her team of LSU AgCenter researchers are developing methods for continuous microwave extraction of the compounds.

Another interesting find in both systems was that after a certain amount of time – 8 minutes in the first system and 4 minutes in the second – extraction rates leveled off.

“So there was no need to heat the mixture for any longer. The maximum extraction was achieved in minutes,” she said.

Sabliov said these results answered an important question the researchers had when they started the project.

“We wanted to know if we really would be competitive with conventional systems,” she said. “Now we are confident that we are, so now we can move on.”

Sabliov’s next step is to work on a larger scale. She has the equipment to begin the process and will start later this year.

Meanwhile, Xu has been testing the antioxidant activity of the extracted isoflavones. He used fish oil as a model to study the stabilizing properties of the isoflavones.

According to Xu, the lipids (fats) in meat oxidize or break down, and that causes the meat to become rancid. He tested his theory that isoflavones could work as a preservative on fish oil, which contains the most susceptible lipids.

Xu was successful in his efforts and also proved that “the defatted soy flour extract could significantly reduce the degradation of health beneficial omega-3 fatty acids in foods fortified with fish oil.”

Next, Xu will work on inserting the isoflavones into ground meats such as hamburger patties and sausage.

“If it can stabilize fish oil, then of course it can stabilize meat,” Xu said.

Extracting the isoflavones at a high purity is important to Xu’s work. During the extraction process, soy proteins and carbohydrates could be left and produce “soybeany” off-flavors in the meat.

With purer, highly active isoflavones only a small amount (as little as 1 percent) can be added to achieve the desired results – fresher, healthier food.

“It will not affect the taste or texture of the food,” Xu said.

But the project could positively affect the value of soybeans post-harvest.–**Tobie Blanchard**

Scientists studying winter weed control

Late-fall to early-winter herbicide application is a new approach to managing winter weeds in Louisiana.

But limited research in 2008 by Dr. Donnie Miller and Dr. Bill Williams, associate professors at the LSU AgCenter's Northeast Research Station in St. Joseph, indicates herbicide applications in September through early November are less effective than applications made in late November or December.

Miller said this possibly results from an interaction between the herbicides and soil microorganisms that are still highly active prior to onset of colder weather.

The majority of the herbicides being researched either have only soil activity or exhibit primarily broadleaf activity when applied to emerged weeds – with limited control of emerged grass species.

In cases where winter grasses have emerged prior to application, adding paraquat or glyphosate has enhanced control, the researchers said.

One concern regarding fall/winter herbicide applications is that with native winter vegetation removed, soil left bare is exposed to rainfall during winter, which may affect row integrity for spring planting, Miller said.

Producers also are cautioned that while these applications are effective through winter, they may not eliminate the need for a follow-up treatment prior to or at planting.

"Economic consideration should be made when deciding whether to use these programs," Miller said. In addition, producers should confirm whether the use of fall/winter weed control programs and removal of winter vegetation would affect their compliance with conservation programs in which they participate that may require a certain amount of vegetation be present to avoid erosion on certain soils.

Miller said future research will concentrate on identifying programs that remove common broadleaf winter weeds but maintain some winter vegetation, primarily annual bluegrass, which is easier to control in the spring.

Weed control in the spring prior to planting has most often relied on programs including glyphosate or paraquat as the primary herbicide, but overuse can lead to increased incidence of weed resistance.

In Louisiana, weeds such as mare's tail, henbit and ryegrass often require a tank mixture of as many as three different herbicides if the optimum herbicide application timing is missed, Williams said. "Even then, these weeds are not always adequately controlled, and cost is definitely increased," he said.

The LSU AgCenter recommends that herbicides be applied six to eight weeks prior to planting to remove winter vegetation and eliminate problems with insects migrating from weeds to emerging crops, Williams said. But rain and wind can make it difficult to achieve that interval, he added.

Checkoff funds for these projects: $63,000

Herbicides applied later in the spring on cotton and soybean fields can lead to situations of off-target drift that can negatively affect emerged crops (such as corn or wheat that was planted earlier) or homeowner gardens or flowerbeds, he added.

Because of such concerns, interest has increased in applying herbicides with soil activity in the late fall and early winter to eliminate or reduce the amount of weeds that germinate in winter and are present in the spring prior to planting, Williams said.

Delays in spring herbicide applications lead to not only increased insect problems but also reduced herbicide efficacy because of larger weeds and/or weed growth stages at which weeds are not as susceptible, Miller said.–**Mary Ann Van Osdell**

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Better wheat prices lead to comeback

Continued from page 1

eastern United States, and SunGrains breeders exchange breeding material and test each other's lines across a wide range of environments.

"You get a lot more and better data sooner," Harrison stressed about the collaborative effort, which sometimes reveals potential varieties that grow well in one state but were developed by breeders in another state.

"The SunGrains group probably accounts for 80 percent of the wheat acreage in Louisiana and the majority of wheat varieties grown in the region," Harrison said.

Wheat breeding is largely a function of public institutions rather than private companies, he said.

Breeding a new variety typically requires a decade of selection, testing and seed increases, Harrison said. To cut a year or more off that time, he has an arrangement to grow wheat in South America during the summer which permits production of two generations in a year.

Many traits have to be considered in developing a new variety for Louisiana growers. For example, varieties grown in Louisiana have to be tolerant of the state's tendency for wet growing conditions.

Disease resistance also is a big requirement for Southern growers,

Photo by Mary Ann Van Osdell

LSU AgCenter plant pathologist Dr. Boyd Padgett discusses fungicide trials and disease control at a recent wheat and oat field day at the AgCenter's Macon Ridge Research Station at Winnsboro.

Harrison said, explaining different diseases, particularly rust, can cost farmers money that has to be spent on fungicides.

Another pest that has to be considered in new varieties is the Hessian fly – a small insect that feeds on wheat seedlings. Harrison said the fly leaves behind a toxin that can make a plant develop poorly. The LSU AgCenter-released variety AGS 2060 is resistant to the insect, he said.

Harrison expects Louisiana farmers to plant 400,000 acres or more of wheat this fall because of continuing good prices. In addition, he said the seed supply should be more plentiful.

Dr. Boyd Padgett, LSU AgCenter plant pathologist, said Harrison's breeding program has developed varieties that have good disease resistance. But rust problems develop and subside from year to year, he said.

In Southwest Louisiana and other parts of the United States, scab or headblight disease also is a problem, and the LSU AgCenter is part of a national effort to address the problem.

Harrison, Padgett and LSU AgCenter researcher Dr. Don Groth are cooperating in developing wheat varieties with genetic resistance to headblight.

Regarding another pest, LSU AgCenter weed scientist Dr. Bill Williams said Italian ryegrass poses the biggest weed problem for Louisiana wheat growers. It is competitive with wheat, and producers can be penalized by grain elevators for having high amounts of Italian ryegrass seed in their harvested crop.

Checkoff funds for these projects: $87,659

Fields with high populations of ryegrass likely will require two herbicide applications, Williams said, with one in November or December and a follow-up in February.

The herbicides used in the fall should have residual activity, like Finesse and Sencor. Products with no residual action – such as Osprey, Axiom and Hoelon – are better-suited for the spring, Williams advised.

Farmers who save wheat seed should consider whether their fields have high ryegrass infestations. If that's the case, Williams advised, it would be wiser to use certified seed to prevent problems.

The LSU AgCenter expert also said weeds that are more typical in the Midwest, such as cheatgrass and bromegrass, fortunately are not posing problems in Louisiana yet, but he said those are likely to increase as more wheat is produced – especially in fields that remain in wheat year in and year out.–**Bruce Schultz**

Photos by John Chaney

LSU AgCenter personnel at the Dean Lee Research Station are studying raised-bed planting of a double crop of wheat and soybeans. During this first year for the demonstration, the wheat yielded 55 bushels per acre. The soybeans, which were planted May 29, had not been harvested at press time.