LOUISIANA Agriculture

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Assuring Our Future Through Scientific Research and Education

Children learn agriculture

Weeds get harder to control

New sugarcane good for industry

LSU AgCenter Research & Extension

Herbicide-Resistant Weeds

Another Limitation to Crop Production

James L. Griffin

Entomologists for many years have dealt with insect resistance to insecticides. For weed scientists, however, weed resistance to herbicides is relatively new. Herbicide resistance occurs when a weed population is able to survive a herbicide treatment that under normal use conditions would be controlled. The adage of "survival of the fittest" applies here, and, in fact, weed resistance to a herbicide is an example of accelerated evolution. The process begins with just a few plants with the genetic capacity to survive the herbicide treatment. It is believed that these plants, which occur naturally in the population at a low level, are not a result of genetic mutation caused by the herbicide. These inherently resistant plants when exposed to the same herbicide over several years produce seed, and over time the population slowly shifts such that the resistant weeds become dominant. Since this process is slow, the producer may not notice the problem until large-scale weed control failures occur.

Roundup Ready crops introduced in 1996 allowed glyphosate herbicide to be applied to the crop without concern for injury. Because glyphosate was effective on most weeds and was economical, use of soil-applied herbicides at planting declined, and in many cases, weed control programs consisted of multiple applications of only glyphosate. Even though the development of the Roundup Ready technology has greatly benefited weed management programs in the Midsouth, long-term use of glyphosate has selected for glyphosate-resistant weeds. In the states of Alabama, Arkansas, Georgia, Mississippi, Missouri, Tennessee and North Carolina, at least one weed species has been confirmed as being resistant to glyphosate. Weeds resistant to glyphosate

Photo by Bruce Schultz

LSU AgCenter weed scientist Daniel Stephenson holds up a pigweed to show farmers gathered for the Dean Lee Research Station field day on Aug. 4.

(Continued on page 27)

James L. Griffin, Lee F. Mason LSU Alumni Association Professor, School of Plant, Environmental & Soil Sciences, LSU AgCenter, Baton Rouge, La.

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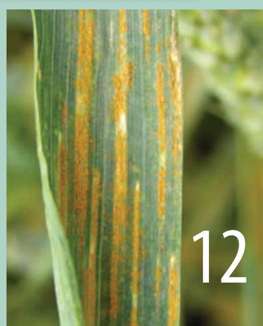

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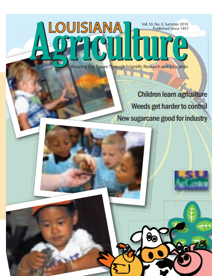


ON THE COVER: LSU AgCenter programs in all corners of Louisiana bring information about agricultural and forestry products to the state's school children. Read more on page 16. (Photos, top to bottom, by Bruce Schultz, Mark Claesgens and Bruce Schultz.)

Reagan selected national expert, EPA liaison

Thomas E. "Gene" Reagan, LSU AgCenter professor of entomology, has been selected as the Entomological Society of America's 2010 Subject Matter Expert. This new award is presented to a person who has gained national and international recognition as an authority on insect pest management. This person then serves as the society's liaison to the Environmental Protection Agency's Office of Pesticide Programs.

Thomas E. "Gene" Reagan

Reagan, the Austin C. Thompson Distinguished Professor in the AgCenter, is a native Louisianian and received his B.S. and M.S. degrees from LSU. His Ph.D. is from North Carolina State University, where he worked for a couple of years as an extension entomologist. He then returned to LSU in 1977 and has been here ever since. His research focus has been sugarcane insects, and he also teaches entomology classes.

Reagan has served as major professor for more than 20 graduate students, including 11 Ph.D. students. He has more than 230 scientific publications, including 75 in peer-reviewed journals and 76 in arthropod management tests involving pesticide efficacy. During the past nine years, he has acquired more than $1.5 million in national competitive grant support.

He has served more than 10 years as faculty adviser to the Entomological Society's student debate program and is chair of the Environmental Entomology Editorial Board. He has been on review panels for the U.S. Department of Agriculture and the EPA, and he is on the Entomological Foundation Board of Counselors.

Previous awards include the LSU College of Agriculture Graduate Teaching Award, the Louisiana Agricultural Experiment Station Career Research Award and Team Research Award, and the LSU Distinguished Faculty Award for research, teaching and service.

Reagan also received an outstanding service award in research and education from the Louisiana sugar industry. In 2009, he was the Entomological Society's Distinguished Achievement in Teaching Award nominee from the Southeastern Branch.

■ **Linda Foster Benedict**

12 new 4-H Hall of Fame members feted at ceremony

A dozen new members of the Louisiana 4-H Hall of Fame were recognized at a ceremony Aug. 11 at the Louisiana 4-H Museum in Mansura for their years of service to 4-H clubs across the state.

"It's an honor being honored for what you were supposed to be doing," Jack Dillard of Caddo Parish told the crowd of more than 150 people. "What are we living for besides kids?"

Another inductee, David Saucier, of Bienville Parish, said his work in 4-H has been a fulfilling experience.

"It became an extension of the family," Saucier said. "4-H members enrich you."

So far, 124 people have been inducted into the Hall of Fame. Their photographs and biographical sketches are part of a Hall of Fame exhibit at the museum. Hall of Fame inductees were: Dr. Katherine Beier, of Ascension Parish; Sharon Chatagnier, of Terrebonne Parish; Anne Chauvin, of Lafayette Parish; Jack Dillard, of Caddo Parish; Stanley J. Lamendola, of East Baton Rouge Parish; Alice LeJeune, of Rapides Parish; Denver T. Loupe, of East Baton Rouge Parish; Johnny L. May, of DeSoto Parish; Mamie McMillion, of St. Charles Parish; David Saucier, of Bienville Parish; Albert H. Steinbach (deceased), of East Baton Rouge Parish; and Otis J. Stelly Sr. (deceased), of Vermilion Parish.

■ **Bruce Schultz**

Photo by Bruce Schultz

Stanley Lamendola, left, is one of 12 honorees added to the 4-H Hall of Fame in 2010. Paul Coreil, vice chancellor for the LSU AgCenter, presented him an award at a ceremony on Aug. 11.

So far, sweet potato outlook much better than past 2 years

With sweet potato consumption rising and a shift in the industry toward more processed products, LSU AgCenter scientists showed growers how to optimize production at a field day held at the Sweet Potato Research Station in Chase on Aug. 24.

Don La Bonte, LSU AgCenter sweet potato breeder, said one of the goals in his breeding program is to develop a tougher-skinned sweet potato. These potatoes will be more suited to the processing industry, where sweet potatoes are subjected to more handling than in the fresh market.

Arthur Villordon, LSU AgCenter horticulturist, demonstrated a model validation sensor system that can transmit real-time data of air temperature and relative humidity, wind speed and direction, precipitation and soil temperature to smart devices such as an iPad.

He is developing a prototype model to represent the relationship between fresh market yield and some agroclimatic variables known to influence storage root initiation in sweet potatoes. It is a tool similar to one developed by NASA to assist engineers in the interpretation of telemetry from the space shuttle, he said.

Villordon said management interventions that can be controlled are variety, seed roots, transplant characteristics, planter operation, plant stand, moisture, drainage, nutrition, pest management, Photo by Mary Ann Van Osdell

Participants at the Sweet Potato Station field day on Aug. 24 look at samples of sweet potatoes in a research plot.

and planting and harvest dates. Environmental values not able to be controlled are air and soil temperature, light intensity and duration, humidity and wind.

Everlyn Wosula, LSU AgCenter graduate student in plant pathology, told producers she is trapping aphids that spread viruses and monitoring the aphid populations. She said the AgCenter is conducting research to minimize the spread of viruses in sweet potato production.

Rick Story, LSU AgCenter entomologist, said he is testing insecticide options for sweet potatoes to determine which are best for Louisiana conditions.

"Twenty-five insecticides are currently available," he said. "Ten years ago there were only six."

Reniform nematodes are the dominant nematode in sweet potatoes in Louisiana, said Tara Smith, LSU AgCenter sweet potato specialist. "We are looking at labeled nematicides to compare yield and quality."

Smith said she is also testing row spacing and plant spacing and their relationship to the nematode management strategies for the crop.

Part of her evaluation will be conducted at the sweet potato farm of Ken Thornhill, which is near Chase.

Thornhill said this year looks to be much better than the past two for sweet potato production.

"May was a fair month, but after June 10, it's been hot and dry," Thornhill said. He installed irrigation on his farm years ago, and it has paid off, he said.

"Moisture is critical to grow roots," he said.

Kurt Guidry, LSU AgCenter economist, said 2008 and 2009 were two of the worst years for sweet potato production because of too much moisture at the wrong times. Two hurricanes in September of 2008 devastated the sweet potato harvest as did excessive rain during the harvest of 2009.

Guidry said demand for sweet potatoes in the United States has risen from 4.3 pounds per person in 2003 to 5.4 pounds per person in 2009.

"Supply and demand and the price support system seem fairly favorable moving forward," Guidry said.

■ **Mary Ann Van Osdell**

Herbicide resistance looms as problem for La. soybean farmers

Herbicide-resistant weeds have been causing havoc in crop fields across the South, and they appear to be "just an eyelash away" from being confirmed as a problem in Louisiana, an LSU AgCenter weed scientist told the participants at the at the Aug. 4 field day at the Dean Lee Research Station in Alexandria.

Daniel Stephenson said the three weeds Louisiana farmers are starting to have trouble controlling include Johnson grass, waterhemp and Palmer amaranth, also known as pigweed – all vigorous growers and prodigious pollen producers.

These weeds have been found resistant to glyphosate herbicide in Arkansas, Georgia, Mississippi and Tennessee. Glyphosate is safe to use on Roundup Ready soybean varieties, which are grown on more than 95 percent of the soybean acreage across the country and on nearly all of the million acres of soybeans planted in Louisiana.

Alternative weed control programs – should weed resistance occur here – are under investigation in tests being conducted by LSU AgCenter scientists.

"We don't have a lot of control options right now, but we're working on that," Stephenson said.

He outlined for them some steps to take to prevent glyphosate from becoming ineffective, which would be a severe blow to the soybean industry here. One of his recommendations was to go back to applying pre-emergence herbicides with soil residual activity.

"This allows you to expose weeds to another chemistry," Stephenson said.

Before Roundup Ready soybeans became ubiquitous, farmers used pre-emergence herbicides to control weeds in soybean fields.

"We're recommending going back to using soil residual herbicides," Stephenson said.

Some of the pre-emergence herbicides being tested in the Dean Lee research plots are Authority MTZ, Boundary, Enlight, Prefix, Fierce, Sharpen and Valor.

Farmers will still have to apply glyphosate to weeds that emerge, but the pre-emergence herbicides will have slowed down weed growth and bought time for the soybean plants to grow taller and outcompete the weeds for water and light.

Another technology that would extend glyphosate effectiveness is to plant Liberty Link soybeans, which are resistant to glufosinate, the active ingredient in Ignite herbicide. The only problem is Liberty Link beans are just not available in large quantities.

"Mississippi soybean producers are trying to buy every bag of Liberty Link seed they can find," Stephenson said.

■ **Linda Foster Benedict**

Clover value in pastures rises as nitrogen fertilizer price increases

Kun-Jun Han, Montgomery W. Alison Jr., William D. Pitman,
Michael E. McCormick and John Westra

Warm-season grasses are the most valuable forage resource in Louisiana livestock production, filling the forage demand during the summer and providing hay for winter feed. However, warm-season grasses such as Bermuda grass and Bahia grass require adequate nitrogen fertilizer to provide the energy and protein needed by young, actively growing livestock.

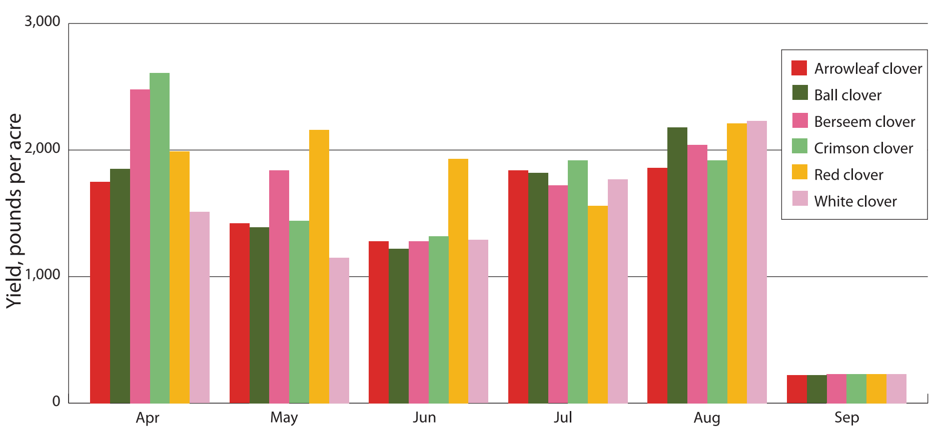
Applying heavier rates of nitrogen fertilizer to pastures may result in some gains in total forage yield and nutritive values of warm-season grasses. However, during the past several years, dramatic fluctuations of fertilizer prices along with high fuel prices have limited profitability of nitrogen-fertilized grass pastures. High nitrogen fertilizer prices along with high fuel prices are expected to continue.

Unlike grasses, legumes, which include clovers, can fix aerial nitrogen gas into organic nitrogen compounds available for use by plants. Legumes do not require nitrogen fertilizer for productive growth. Both annual and perennial clovers are adapted to some Louisiana soils.

The amount of nitrogen supplied from clover can vary depending on clover species and productivity. Planting clover in a pre-existing warm-season grass pasture can be of benefit by reducing nitrogen fertilizer use, producing more nutritious forage, and extending the forage production season. Research during past decades has demonstrated the value of clover in Louisiana pastures, but commercial use has been limited in much of the state. However, because of the increasing cost of nitrogen fertilizer and the availability of new clover varieties, there is renewed interest in clover and its potential value.

Kun-Jun Han, Assistant Professor, Southeast Research Station, Franklinton, La.; Montgomery W. Alison Jr., Associate Professor, Macon Ridge Research Station, Winnsboro, La.; William D. Pitman, Professor, Hill Farm Research Station, Homer, La.; Michael E. McCormick, Professor, Southeast Research Station; and John Westra, Associate Professor, Department of Agricultural Economics & Agribusiness, LSU AgCenter, Baton Rouge, La.

Figure 1. Forage yield distribution of Bermuda grass stands overseeded with various clovers.



An LSU AgCenter research project was designed to compare total yield, nitrogen production and forage digestibility from Bermuda grass receiving zero, 100 or 200 pounds of nitrogen per acre from commercial fertilizer or overseeded with one of six clover species (arrowleaf, ball, crimson, berseem, white and red clover). Three AgCenter research stations – Hill Farm in the northwest, Macon Ridge in the northeast and Southeast – collaborated on this project for two years to quantify the benefit of clover planting in pre-existing Bermuda grass pasture. Clovers were drilled into Bermuda grass pastures in November, and forage was harvested through the growing season of the next year. Sample analysis was conducted at the LSU AgCenter Forage Quality Analysis Laboratory at the Southeast Research Station in Franklinton.

Photo by Kun-Jun Han

Crimson clover seedlings

Photo by Johnny Morgan

Kun-Jun Han stands in a Bermuda grass pasture at the Southeast Research Station that was overseeded with red clover.

Clovers contribute differently to total pasture yield throughout the growing season. Berseem clover and crimson clover are early starters in the spring (Figure 1). These two clovers planted in Bermuda grass pasture yielded about 500 pounds more dry forage per acre than the other slower-starting clovers between mid-March and late April. Because Bermuda grass is a warm-season grass and remains somewhat dormant, the April forage yields are mostly from clover growth. Contrasted to the early-growing clovers, white clover starts much slower in the spring but increases its yield contribution through the growing season lasting until August in some situations. Although not an earlier starter, red clover is long- lasting and contributes to total forage yield of the pasture earlier than white clover.

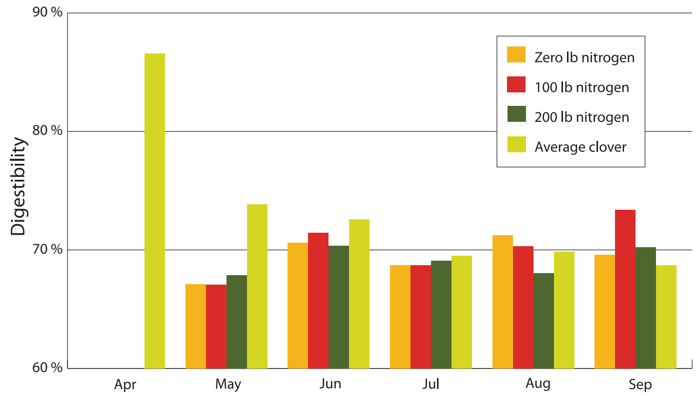
Clover growth is affected by the soil pH, soil type and temperature.

Producers in need of early forage production may be interested in berseem or crimson clover as options. Ball clover is noted as having a high potential for self reseeding, and although not thoroughly investigated in this study, there

Photos by Kun-Jun Han

Ball clover

Figure 2. Mean forage digestibility (%) of the Bermuda grass pastures receiving conventional nitrogen fertilizer (zero pounds nitrogen, 100 pounds nitrogen, 200 pounds nitrogen) or planted with clover.



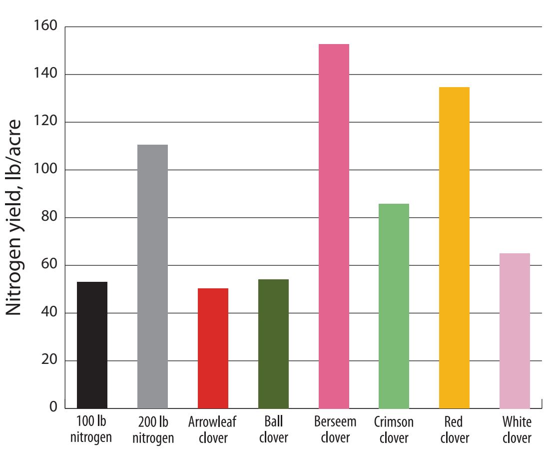
was evidence of reseeding by ball clover. Observations of the test sites at the three Louisiana locations demonstrated some propagation in the second year from ball clover, white clover and red clover.

Clovers contribute to more digestible forage from warm-season grass pastures. Although the warm-season grasses accumulate substantial amounts of forage during the warm season, high fiber and low digestibility of these grasses usually limits forage intake and digestibility. Forage with more fiber remains longer in the digestion system of the animals and reduces intake. All of the clover species are digestible with little difference among the species. Therefore, the average digestibility of the clovers was compared with the nitrogen-fertilized warm-season grass. Until April, the warm-season grass is not actively growing. The majority of the forage harvested before this time consisted of clover, which yielded forage of more than 80 percent digestibility (Figure 2).

May is about the time the warm-season grass begins considerable growth. However, the larger proportion of total forage in the plots overseeded with clover was still mainly clovers. Compared with monoculture warm-season grass, the average digestibility of plots containing clover was 7 to 8 percentage units higher in May cuttings. The higher nitrogen fertilizer did not consistently affect digestibility of the pasture. By the end of the growing season, the digestibility of the different treatments became similar to each other with the dwindling clover not contributing much to the total forage collected.

Estimated nitrogen production from the clover is substantial. Legumes, such as clovers, can fix aerial nitrogen gas into a form available to other plants and eventually to grazing animals (Figure 3). Along with the clover treatments, three treatments receiving zero, 100 or 200 pounds per acre of conventional nitrogen fertilizer were included. Because the zero nitrogen application still produced forage with nitrogen in it, nitrogen production from the zero nitrogen treatment was deducted from

Figure 3. Estimated net nitrogen yield (yield of the zero nitrogen treatment subtracted out) of the Bermuda grass pastures receiving conventional nitrogen fertilizer (100 pounds nitrogen, 200 pounds nitrogen) or planted with various clovers.



Berseem clover

each treatment to estimate net nitrogen production.

Berseem clover produced the most nitrogen, followed by red clover. These clovers yielded more nitrogen than the fertilizer treatments. Nitrogen production from crimson clover was in between those from the 100- and 200-pound-per-acre nitrogen applications.

The value of nitrogen produced in clover systems ranged from $35 per acre for arrowleaf clover to $105 per acre for berseem clover. These values were calculated by multiplying the price for nitrogen fertilizer ($0.685 per pound) by the pounds of nitrogen produced per acre by each clover. The nitrogen fertilizer price was a weighted average price per pound per year over the experiment period (2007-2009), weighted by volume and type of commercially available nitrogen fertilizer sold in the South. When considering other potential benefits from clover production, such as improved digestibility of the feedstock, the economic gains may be greater than the savings achieved by using less nitrogen fertilizer.

Clover contributions differed among locations, with poorer stands of all clovers and less benefit from the clovers on the sandy northwest Louisiana site. Because clovers are site-specific, choosing the best adapted clover in an area is an important aspect of a successful clover-warm-season grass pasture system.

Photo by Kun-Jun Han

Note the legume root nodules below the pen.

Even though berseem, red and crimson clovers are promising in terms of productivity or early growth, they are not suitable for all sites. Some white clover varieties and ball clover have potential on appropriate sites for sustained stands under low input management because of their reseeding ability. Some newer white clover varieties provide potential for longer stand life and expansion of the area of white clover adaptation.

Stand failure in one year because of inadequate moisture on the droughtier northwest Louisiana site illustrates the vulnerability of clovers to adverse establishment conditions and the risk incurred with clover establishment. Careful selection of both clover species and sites along with appropriate management, especially during stand establishment, provides opportunity for both improved forage nutritive value and substantial nitrogen contribution to pasture systems to offset forage quality limitations of the widely grown warm-season grasses and the high cost of nitrogen fertilizer. ■

Forage Lab supports producers, researchers

The LSU AgCenter Forage Quality Laboratory at the Southeast Research Station provides feed and forage analysis for Louisiana and Mississippi forage and livestock producers. The lab also performs forage quality analyses for research conducted in Louisiana and cooperative projects in Mississippi.

The forage laboratory has analyzed samples submitted by Mississippi producers and researchers since a Memorandum of Understanding was signed by the Mississippi Agricultural and Forestry Experiment Station and LSU AgCenter in 1992. That agreement has stimulated collaborative work and information sharing among researchers in both states.

The lab is certified by the National Forage Testing Association, which gives producers and researchers added confidence in the results received. Results are used to formulate diets for dairy, beef, horses and other livestock. Many hay producers also rely heavily on the lab to provide the basis of marketing hay according to nutritive value, said Kun-Jun Han, a forage agronomist at the station.

The laboratory annually analyzes around 1,500 producer samples and about 900 research samples. It is equipped to provide both near-infrared reflectance spectroscopy and conventional wet chemistry testing. Samples can be analyzed for dry matter, neutral detergent fiber, acid detergent fiber, crude protein and important minerals. Additional analyses, such as *in vitro* true digestibility and soluble nitrogen concentration, also are performed for many research projects.

Typical producer samples received for analysis include total mixed rations, mixed concentrate feeds, silage, haylage, hay, by-product feeds and fresh forage samples. Besides the standard feed analysis for protein and energy values, the forage lab provides mineral analysis services to producers and researchers.

Accurate feed analyses allow for diets more precisely balanced to meet animal requirements, which in turn could improve animal performance, increase profitability and ultimately reduce nutrient loads in the environment.

Please contact Laura Zeringue at lzeringue@agcenter.lsu.edu for more information. ■ **Rick Bogren**

Calf to Carcass Program

makes Louisiana cattle production more profitable

The LSU AgCenter's Calf to Carcass Program helps beef cattle producers learn how their animals perform after they are weaned and in the marketplace. These records help improve cattle production in Louisiana and make it more profitable, said Tim Page, coordinator and animal sciences professor.

The program provides a system for getting information back to the producer about how well their beef calves fare during finishing in an Oklahoma feedlot and the meat quality at the packing plant. Since the program began in 1993, more than 800 producers have participated, Page said.

Most Louisiana cattle producers have cow-calf operations. They raise calves until they are 6-8 months old and then sell the calves to someone else. With this production system, the producer has no knowledge of how his calves perform later in life or what their meat quality is. The Calf to Carcass Program allows producers to retain ownership of their calves through the feedlot – in this case an Oklahoma feedlot – where they are grain-fed until marketed to a meat packing plant for processing.

Participants in the Calf to Carcass Program, which is about 7 percent of Louisiana's 11,500 beef producers, take their calves to one of four preconditioning sites in the state. These include LSU AgCenter facilities at the Baton Rouge campus, Dean Lee Research Station near Alexandria, Nicholls State University and McNeese State University.

"At the preconditioning sites, we vaccinate the calves, de-worm them and place several ear tags, and we precondition them for 45 days," Page said.

Preconditioning ensures that the calves are healthy and eating adequately from feed troughs before they are loaded up and hauled to the feedyard in Guymon, Okla.

Calves have to be dehorned and castrated before arrival at the preconditioning sites and well-healed from these two procedures. Each producer must bring at least three calves and pay $85 per head to cover costs of transportation and feed.

The Calf to Carcass Program encourages producers to obtain a premise identification to show where calves originated. Page said some producers are wary of the system, fearing it will lead to government intrusion, but the ID system allows for better control in the event of a disease outbreak.

Producers in the Calf to Carcass Program receive reports on average daily gain and feed efficiency in the feedyard, then quality grade, yield grade, ribeye area, backfat and marbling at the packing plant.

In the 2008-09 program, more than 600 calves were sold, and profits per head ranged from a low of $65 for one group of 47 heifers to a high of $225 each for a group of 45 heifers. Average daily gain varied from 2.75 pounds for a group of 47 heifers to 4.11 pounds for 73 steers. Partial data for the 2009-2010 program show profits ranging from $118 per head to a high of $378 per head.

Page said buyers will pay more for calves from producers who have been through the program.

A cattle owner not satisfied with what his or her calves bring at sale can

Photo by Bruce Schultz

Most Louisiana cattle producers have cow-calf operations. They raise calves until they are 6-8 months old and then sell the calves to feedlots out-of-state.

go to another more successful producer to find out what makes the difference.

"It's helped to create a network for producers," Page said.

Sponsors include Cargill, Wax Seed Co., Fort Dodge Animal Health, Pfizer, Purina, Lone Star Feeds, Louisiana Cattlemen's Association, the Louisiana Department of Agriculture and Forestry, Intervet, Buffalo Feeders, the Hitch family and Hitch Feedyard. The sponsors provided more than $20,000 in pharmaceuticals and supplies for the Calf to Carcass Program in 2009.

Producers enrolled in the program go on a tour to Oklahoma to get a first-hand look at how their animals stack up against cattle from across the country. They also get to see different operations tied to the cattle industry. Tours have included visits to large ranches, meat packing plants, beef research centers and feedyards.

In March 2010, the tour included a visit to one of the oldest ranches in Texas, the Waggoner Ranch, which at about 550,000 acres is the largest ranch in Texas under one fence. The tour also included visits to the Tyson Fresh Foods beef processing center near Amarillo, Texas, and the Noble Foundation, an Oklahoma-based research facility.

Cattle producer Tom Ardoin of Pine Prairie said he has benefitted from the program.

"What I like so much is seeing the growth our calves make and getting the feedback of the carcass data," Ardoin said.

Before, he said, selling calves "was just a shot in the dark. This is proof-positive that what we were doing did work."

Data he received confirmed that he is using a good bull on his 125 crossbred heifers. "We can advertise that these calves gain this weight and finish at that weight."

Ardoin said Calf to Carcass encourages producers to work with neighbors to put together truckloads of cattle, sharing the transportation costs to Oklahoma feedlots.

"I had never done that before I got involved in the Calf to Carcass Program," he said. "It's given me a market option I never thought about."

John Patrick of St. Francisville, who has 100 cows, divided between registered Angus and registered Herefords, said the program was an eye-opener for him.

"I learned the difference in the value of calves in Louisiana and the value of calves in Oklahoma. I also developed a relationship with the feedlot in Oklahoma," Patrick said.

He also said he partners with other producers to share the costs of shipping cattle to Oklahoma, coordinating a shipment of similar-sized calves.

He said the carcass data from his calves and other producers in the program are invaluable. He learned the importance of vaccination before selling calves. Sick calves at a feedlot require expensive veterinary care and aren't able to gain weight while they are being treated.

Patrick said the program is aimed at enabling small-scale producers to have the same options available to larger operators. "It helps us understand our options."

Tommy Shields, LSU AgCenter county agent in Calcasieu Parish, said the Calf to Carcass Program helps producers learn the ropes of bringing cattle directly to the feedlots. "They get their feet wet, and then they do their own deals," he said.

Shields said even owners of large herds have benefitted from participating in the Calf to Carcass Program.

He said Brahman cattle face an uphill challenge from skeptical buyers outside of Louisiana. But bringing Brahman cattle to Oklahoma has proven that the breed can compete, he said. "It's changed perceptions of some of the buyers up there."

The Calf to Carcass Program has helped Louisiana producers develop the confidence to use what they have learned to increase their profits, Page said.

"But the program is about more than just making a profit from the calves. It's about sustaining and increasing profitability in the future. A producer learns what the buyers want. The buyers are demanding higher yields and quality grading cattle," Page said. ■ **Bruce Schultz**

Bull performance testing helps improve genetics

The bull performance testing program at the LSU AgCenter, which identifies the best genetics of a producer's bulls, has been under way, twice annually, since 1958.

"There have been about 8,000 bulls go through this program," said Danny Coombs, LSU AgCenter animal sciences professor.

Producers usually enroll several bulls in the program, although a single entry is allowed from smaller producers. The cost is $550 per bull, along with a $100 nomination fee.

For 112 days at the Dean Lee Research Station near Alexandria, the yearling bulls are kept in a feed lot and fed a mixed diet high in roughage. The rate of weight gain is monitored closely, and they are put on the scales every 28 days.

"A bull that gains rapidly and efficiently will sire calves that gain rapidly and efficiently," Coombs said.

The animal's ribeye region is examined with ultrasound to determine the size and amount of marbling. A breeding soundness exam is conducted to make sure the young bulls have the potential to produce calves.

Coombs said in the 1960s, the Brahman influence bulls with Beefmaster and Brangus were usually in the program. In the 1970s and early 1980s, the Continental breeds were typically submitted. "Now we're pretty much testing Angus and Charolais," he said.

In 1981, the program was expanded to allow producers to sell bulls that have been in the testing program.

Producers selling their bulls have documented, unbiased data to show potential buyers.

"This provides other producers with a source of good genetics," Coombs said.

Producer Dick Walther of Houma has been sending his Charolais bulls to the program since 1971.

"It's an excellent way for a small producer like me to finish his bulls and market them," said Walther, a retired veterinarian.

He said he also relies on the program to help him select a bull for his own herd.

"I select bulls from the performance data they give me," Walther said. "For a fellow like me with a small herd, it's perfect."

Cattle producer Dave Means of Mansfield said he relies on the program for his Black Angus bulls. He said he sends five or six animals during the winter and summer sessions.

"It's a great asset for the purebred breeder," he said. "It gives us a great opportunity to evaluate performance, and it's good data from an independent and trusted source." ■ **Bruce Schultz**

Disease Management *in Louisiana Wheat*

Boyd Padgett, Myra Purvis, Steve Harrison, Rick Mascagni and Clayton Hollier

If not properly managed, diseases can reduce grain yield and quality, adversely affecting the profitability of wheat production in Louisiana. The major diseases of Louisiana wheat are leaf rust and stripe rust. Until recently, stripe rust was the major wheat disease in Louisiana, but leaf rust has re-emerged as the predominant threat. Symptoms of these diseases and conditions that favor their development are listed in Figure 1. Other diseases that occur less frequently or are not as widespread are bacterial streak, stem rust, leaf and glume blotch, barley yellow dwarf and head scab.

Figure 1. Symptoms of leaf and stripe rusts and conditions favoring disease development.

Parameter	Leaf Rust (left)	Stripe Rust (right)
Pustule Location	Leaf	Leaf and Head
Pustule color	Orange	Yellow
Pustule Arrangement	Single	Stripes
Optimum Temperatures	60-80 degrees F	55-70 degrees F

Effective disease management is crucial to a productive wheat cropping system, the foundation of which is high-yielding, disease-resistant varieties. Each year, LSU AgCenter scientists evaluate genetic resistance to plant pathogens in variety tests planted on research stations across the state. Varieties are monitored for agronomic characteristics and genetic resistance to pathogens. The results from these tests provide producers with a source of unbiased information for variety performance and serve as the basis for variety recommendations. This information can be accessed on the LSU AgCenter website. Go to www.lsuagcenter.com, then to Crops and then to Wheat & Oat.

When resistant varieties are not available or new races of plant pathogens emerge and threaten the crop, fungicides may be needed to combat disease epidemics. Therefore, LSU AgCenter scientists evaluate experimental and commercial fungicides for efficacy against these pathogens.

Field experiments targeting genetic resistance and fungicides were conducted on the Ben Hur Research Station, Baton Rouge; the Macon Ridge Research Station, Winnsboro; the Northeast Research Station, St. Joseph; and the Dean Lee Research Station, Alexandria, from 2003 to 2009. Selected fungicide treatments were applied to wheat varieties expressing varying degrees of genetic resistance to leaf and stripe rust (Table 1). Fungicides were applied at flag-leaf emergence, which is when the last leaf emerges just below the head or at 50 percent head emergence. Disease severity on the flag leaf and the flag-minus-one leaf (the leaf just below the flag leaf) was recorded in field plots several times during each growing season. Stripe rust was the predominant disease in 2004 and 2005, while leaf rust predominated from 2006 to 2009. In addition, grain yields and test weights were calculated for individual plots for treatment comparisons.

Stripe Rust Evaluations

In studies conducted during 2004 and 2005, disease severity was less and yields were higher in stripe rust-susceptible wheat varieties treated with fungicides compared with nontreated wheat (Table 2). Stripe rust severity ranged from 50 percent to 16 percent in the initial ratings and 88 percent to 50 percent in the last ratings. Initial severity was lowest in wheat treated early at the flag-leaf emergence stage; however, by late season, severity was similar among most fungicide treatments. Yields in treated wheat were 20 percent to 30 percent more than the nontreated wheat. There were minimal differences in yield among fungicide treatments based on application timing.

In four tests conducted during 2005, the fungicide Quilt was added as a treat-

Table 1. Classes of fungicides and commercial fungicides in these classes.

Fungicide Class		
Strobilurin	Triazole	Fungicide
X		Headline
X		Quadris
X	X	Quilt (premix)
X	X	Stratego (premix)
	X	Tilt

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Table 2. Disease severity and yields for tests conducted in stripe rust-susceptible varieties during 2004 and 2005.

		2004 and 2005			2005		
Treatment (fl oz/a)	Growth Stage	Stripe Rust First Rating	Stripe Rust Last Rating	Yield (bu/a)	Stripe Rust First Rating	Stripe Rust Last Rating	Yield (bu/a)
Nontreated	--	50%	88%	39	59%	94%	22
Tilt (4.0)	F8	18%	58%	54	30%	89%	37
Quadris (6.2)	F8	22%	59%	52	35%	86%	36
Quadris (6.2)	F10.2	37%	52%	49	55%	75%	27
Headline (6.2)	F8	19%	65%	51	30%	89%	33
Headline (6.2)	F10.2	37%	50%	51	59%	72%	30
Stratego (10.0)	F8	16%	59%	55	26%	89%	38
Quilt (14.0)	F8	--	--	--	17%	87%	48

The fungicides were applied at growth stages F8 (flag leaf emergence) or F10.2 (50% head emergence).

Table 3. Disease severity and yields for tests conducted in stripe rust-resistant varieties during 2003 and 2004.

Treatment (fl oz/a)	Growth Stage	Stripe Rust First Rating	Stripe Rust Last Rating	Yield (bu/a)
Nontreated	--	2%	5%	53
Tilt (4.0)	F8	0	1%	57
Tilt (4.0)	F10.2	3%	3%	54
Quadris (6.2)	F8	Trace	1%	51
Quadris (6.2)	F10.2	Trace	Trace	59
Headline (6.2)	F8	Trace	1%	53
Headline (6.2)	F10.2	1%	2%	54

The fungicides were applied at growth stages F8 (flag leaf emergence) or F10.2 (50% head emergence).

Table 4. Disease severity and yields for tests conducted in leaf rust-susceptible varieties during 2005, 2008 and 2009.

Treatment (fl oz/a)	Growth Stage	Leaf Rust First Rating	Leaf Rust Last Rating	Yield (bu/a)
Nontreated	--	46%	84%	46
Tilt (4.0)	F8	22%	70%	56
Quadris (6.2)	F8	21%	56%	58
Quadris (6.2)	F10.2	25%	55%	57
Headline (6.2)	F8	18%	62%	60
Headline (6.2)	F10.2	26%	49%	58
Quilt (14.0)	F8	12%	43%	64
Stratego (10.0)	F8	10%	62%	60

The fungicides were applied at growth stages F8 (flag leaf emergence) or F10.2 (50% head emergence).

Table 5. Yields and test weights for fungicides applied to Terral LA841 during 2007-2008.

Treatment (fl oz/a)	Growth Stage	Test Wt (lb/bu)	Yield (bu/a)
Nontreated	--	58	60
Headline (6.0)	F8	58	60
Quilt (14.0)	F8	58	60
Stratego (10.0)	F8	58	59
Tilt (4.0)	F8	58	57

The fungicides were applied at growth stages F8 (flag leaf emergence) or F10.2 (50% head emergence).

ment. Results were similar to 2004-2005. All stripe rust-susceptible varieties benefited from a fungicide application (Table 2). Based on early-season ratings, disease severity was lowest in wheat treated with Quilt; however, by late season, disease severity was high in all treatments. Disease severity was affected by application timing. Initial severity was less in wheat treated at flag-leaf emergence. Yields from fungicide-treated wheat were 25 percent to 54 percent more than the nonsprayed wheat. Application timing also affected yield. Yields were higher in wheat treated with Quadris or Headline at flag-leaf emergence compared with applications at the 50 percent head emergence stage. There were minimal effects on yields when fungicides were applied in the absence of stripe rust (Table 3).

Leaf Rust Evaluations

Leaf rust developed to damaging levels in tests conducted during 2005, 2008 and 2009. Disease severity in leaf rust-susceptible varieties was less in all wheat treated with a fungicide than in the non-treated wheat (Table 4). Disease severity in the initial rating was 46 percent in the non-treated and was lowest in wheat treated with Quilt at flag-leaf emergence. Disease severity in final ratings ranged from 84 percent (non-treated) to 43 percent (Quilt at flag-leaf emergence). Fungicides had minimal influence on test weights. Yields for all fungicide treatments were 17 percent to 27 percent higher than for the non-treated wheat. Disease severity was less in wheat treated with Headline at flag-leaf emergence compared with Headline applied at 50 percent head emergence; however, this difference in severity was not reflected in yields. Disease severity did not differ between the application timing of Quadris. Yields and test weights of the rust-resistant variety Terral LA841 did not differ among non-treated and fungicide-treated wheat (Table 5).

The residual activity of fungicides varied among products; however, most products provided at least four weeks of protection against both rust pathogens. It is important to note that residual activity can be eroded by harsh environmental conditions such as excessive rainfall or other conditions favorable for disease development. Generally, the most effective products are premixes of a strobilurin (azoxystrobin and trifloxystrobin) plus propiconazole. Propiconazole – the active ingredient in the fungicide Tilt – applied alone also provided satisfactory residual activity.

Leaf and stripe rusts can be managed effectively using high-yielding, disease-resistant varieties. When these varieties are used, a fungicide usually does not provide an added benefit. When susceptible or moderately susceptible varieties are used, however, a fungicide may provide economic returns. While both rusts reached damaging levels in susceptible varieties, stripe rust caused more damage than leaf rust in these studies. This may be attributed to earlier initiation of stripe rust epidemics resulting in a longer period for disease development compared with leaf rust. Application timing was not a significant factor in most tests; however, in some tests the early timing (flag-leaf emergence) provided more protection than the later application (50 percent head emergence.). This was more pronounced when epidemics began prior to the later application. ■

Acephate resistance widespread

in Louisiana tarnished plant bug populations

Josh T. Copes, Gordon L. Snodgrass, Jonathan Sharp, B. Rogers Leonard, Dennis Ring and David C. Blouin

The tarnished plant bug is the most yield-limiting and costly arthropod pest attacking Louisiana cotton. Integrated pest management tactics are limited for tarnished plant bug, and infestations are controlled almost exclusively with chemicals. This insect is a persistent, season-long pest and typically requires multiple insecticide applications to maintain adequate control and reduce economic losses. The organophosphate insecticide acephate has been one of the products recommended to control this pest. However, in recent years, the actual amount of acephate applied to Midsouth cotton acreage has approached the maximum frequencies of sprays and total active ingredient allowed by the label in a season. Despite the increased use, reports of poor field performance with acephate against this pest have become common. Acephate resistance in tarnished plant bugs could potentially limit cotton production. The purpose of this study was to survey acephate susceptibility among Louisiana populations of tarnished plant bug using field trials and laboratory bioassays.

Twenty field trials were conducted in six parishes – Franklin, Madison, Ouachita, Richland, Tensas and West Feliciana – during 2007-2009 against native infestations of tarnished plant bugs (Figure 1). Five treatments, including a nontreated control and four rates of acephate (0.5, 0.75, 1.0 and 1.25 pounds active ingredient per acre of Orthene 97 SP) were included in each trial. The trial sites included areas on commercial fields and LSU AgCenter research stations. The effects of each insecticide treatment were estimated by counting the numbers of tarnished plant bugs that remained in each plot at five to seven days after the application. The general procedure used to sample field plots required the use of a black shake sheet (2.5 feet by 2.5 feet) placed between two rows of cotton. The plants adjacent to each side of the sheet were vigorously shaken to dislodge all insects and have them fall onto the cloth. All tarnished plant bugs were recorded on the sheet. The process was

Figure 1. Field trial sites (black dots) and collection locations (red dots) for surveys of acephate efficacy and susceptibility of tarnished plant bugs during 2007, 2008 and 2009.

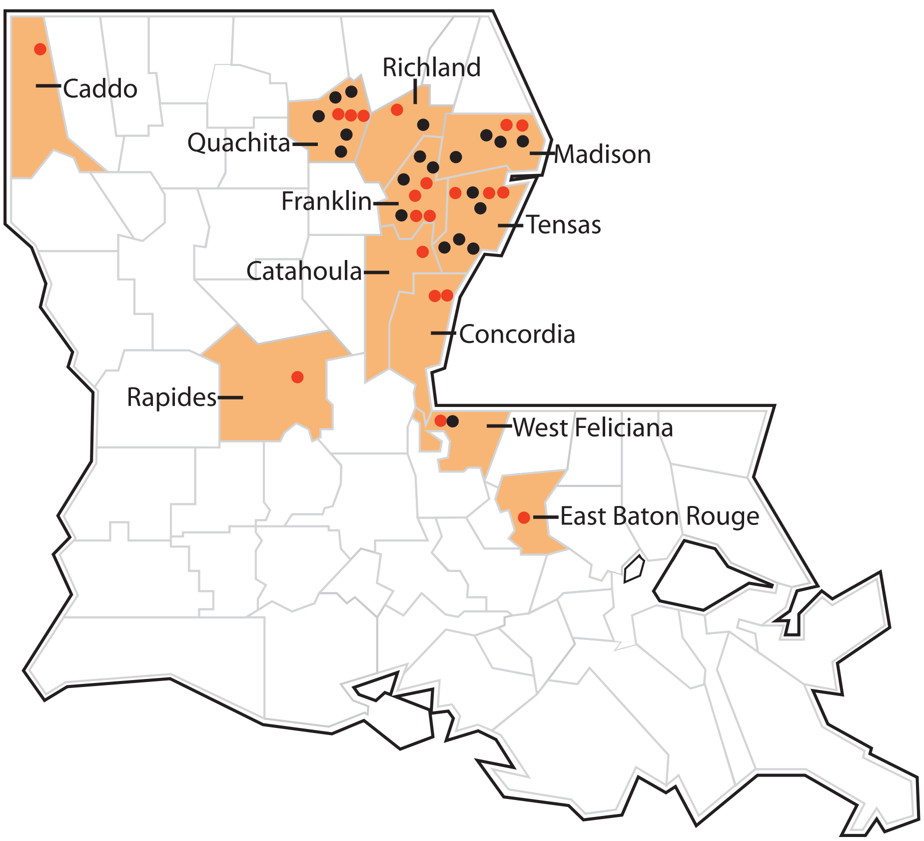

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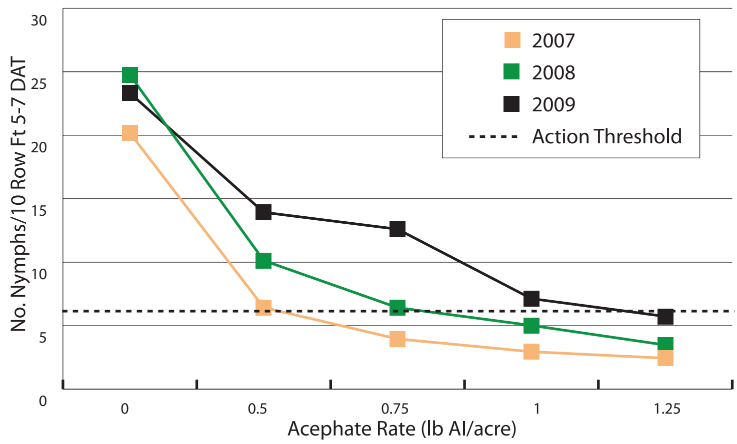
Figure 2. Three years (2007-2009) of acephate efficacy against the tarnished plant bug in Louisiana field trials. The dotted line indicates the action threshold of six tarnished plant bugs/10 row feet.



repeated in each plot for a total sample of 10 row feet.

In 14 of the field trials, acephate applied at 0.5 pounds active ingredient per acre reduced tarnished plant bug below the levels in the nontreated plots. However, this rate provided acceptable field control only during the 2007 trials, based upon reducing infestation levels below the action threshold of six insects per 10 row feet (Figure 2). During 2008 and 2009, acephate rates of 0.75-1.25 pounds active ingredient per acre were needed to adequately control infestations. These results indicate that acephate efficacy at a given rate appears to have decreased during 2007-2009.

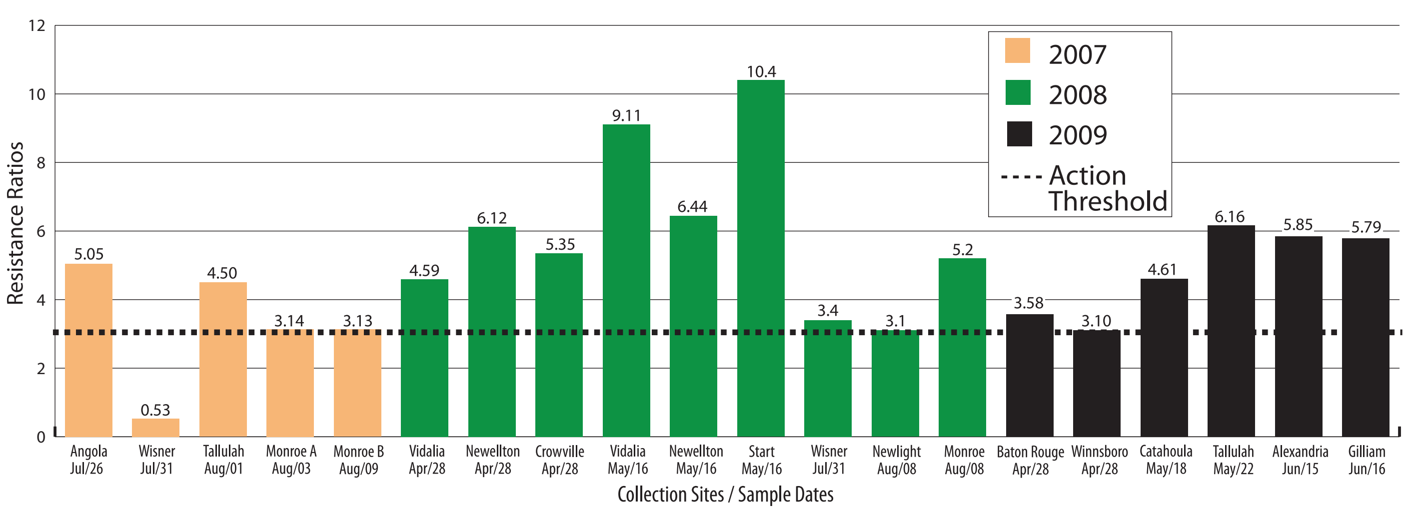
Laboratory bioassays were used to estimate acephate dose mortality responses for 20 populations of tarnished plant bugs collected during the 2007-2009 period. Insects were collected in nine cotton-producing parishes including those mentioned above plus Caddo, Catahoula, Rapides and Concordia. Insects were also collected in one noncotton-producing parish (East Baton Rouge) from March to September of each year (Figure 1). A standard sweep-net (15 inches diameter) was used for collecting insects from native host plants and cotton.

A resistance ratio of 3.0 was used to estimate the likelihood of field control failures with acephate (Figure 3). The ratios ranged from 0.53 to 10.4 among Louisiana populations sampled during 2007-2009. All populations surveyed during the study demonstrated resistant ratios greater than 3.0, except for the 2007 Wisner population. Only five other populations – 2007 Monroe A (3.14), 2007 Monroe B (3.13), 2008 Wisner (3.4), 2008 Newlight (3.08) and 2009 Winnsboro (3.10) – expressed resistance ratios similar to the 3.0 critical level.

The results show that Louisiana tarnished plant bug populations are maintaining a high frequency of insecticide resistant individuals even prior to acephate exposure on cotton. Field efficacy trials and laboratory bioassays indicate that resistance in Louisiana tarnished plant bugs is partially responsible for decreasing acephate performance. Acephate resistance levels are variable, but widespread across the state. Field efficacy trials indicate that to successfully control persistent tarnished plant bug infestations, acephate rates of at least 0.75 pounds active ingredient per acre would be required.

To maintain the value of acephate in cotton production for control of tarnished plant bug, producers and pest managers should limit the frequency of acephate sprays per season, rotate with other recommended insecticides and co-apply acephate with other products that demonstrate different modes of action. In addition, acephate applications that target other pest species in adjacent crops may be exposing populations of tarnished plant bugs to selection pressure prior to their migration into cotton. Therefore, chemical control strategies for pest management across the farmscape should consider the impact of acephate selection on tarnished plant bugs and include the use of alternative chemistry whenever appropriate. Furthermore, complete reliance on the alternative recommended products will likely not solve this problem. ■

Figure 3. Acephate resistance ratios (RR's) for Louisiana tarnished plant bugs collected during 2007, 2008 and 2009. The horizontal line describes the critical RR of 3.0 at which satisfactory field control with acephate may not be achieved when values of Louisiana populations exceed that level.



Louisiana youth learn

Tara P. Smith

The LSU AgCenter's research and educational outreach programs are an integral piece of Louisiana's agricultural framework. Forest, crop and animal production supply countless jobs and economic opportunities for Louisiana, and both urban and rural communities benefit from the many agricultural commodities and industries that contribute to Louisiana's economic development. Teaching the value of agriculture to both youth and adults is critical to the sustainability of agriculture in the state.

One way that the LSU AgCenter raises agricultural awareness is through 4-H programs and sponsored events – including local, district and state livestock shows and club meetings. In addition, five large agricultural awareness events take place each year. Several of these events sponsored by the AgCenter and partner agencies and organizations target children in kindergarten through fifth grade and are attended primarily by school group tours. Some of the events also are open to the general public. Each event is unique, but all have the common goal of educating youth about food and fiber crops produced in Louisiana.

AgCenter extension and research faculty design and participate in these youth development programs. In addition, numerous volunteers contribute countless hours. Each event features interactive areas where students experience agriculture first-hand. In addition to commodities, exhibits such as "Down on the Farm" are designed as enrichment opportunities to teach visitors about food production and safety.

Other exhibits, such as "Body Walk," teach nutrition and health and are designed to combat childhood obesity. "Body Walk" is sponsored by the LSU AgCenter and Blue Cross and Blue Shield of Louisiana Foundation and is part of a comprehensive extension program known as "Smart Bodies."

AgMagic is held each spring on the LSU AgCenter campus in Baton Rouge. AgMagic provides an opportunity for children and adults to understand how the products and food they use and consume every day are part of a larger agricultural system. 2010 marked the seventh year of AgMagic. Several interactive features of AgMagic include "Animals produce for you," "Plant products," "Farming the waters," "The world of wonder," "Bugs rule" and "Farm gate to dinner plate." In 2009, AgMagic was introduced to the State Fair of Louisiana in Shreveport. In addition to guided school group tours, AgMagic at the State Fair was open during regular fair hours and offered a similar experience to AgMagic in Baton Rouge.

Similar youth-oriented agricultural

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magic of agriculture

experiences have evolved in other areas of the state. Ag Alley, which began in 2004, is held each January in West Monroe in conjunction with the Northeast Louisiana Agricultural Expo and focuses on the main crops of economic importance produced in northeast Louisiana. Past exhibits have featured cotton, corn, sweet potatoes, rice, poultry, horses, aquaculture, beef, water quality and the ever-popular 4-H Mini Farm. Ag Alley, which is sponsored by the North Louisiana Agribusiness Council, has grown in attendance each year and now reaches more than 1,000 visitors.

Northeast Louisiana also hosts Ag Adventures in Delhi. This program began in 2008 and incorporated some parishes that traditionally had not participated in Ag Alley. In 2010, more than 800 children attended this event, which since its inception has exposed visitors to livestock, horses, sweet potatoes, cotton, corn, vegetables, poultry and rice.

Southwest Louisiana also features an agricultural awareness event called Ag Adventures, which is held in conjunction with the LSU AgCenter Southwest Regional Livestock Show in Lake Charles. Similar to other events, this program focuses on crops, animals and products important in the local agricultural economy. In 2010, Ag Adventures included information on wetlands ecology, crawfish, proper diet, hand washing and horseback riding.

School teachers who bring their students to these events continue to express their gratitude over the value of the experience in helping children learn about science. For example, after attending Ag Adventures in Lake Charles, Debra Shamsie, a kindergarten teacher at Prien Lake Elementary School in Lake Charles, said, “Seeing it in pictures is nothing like real life. The students get to experience the actual animals. This is fantastic.”

The practical knowledge and real-world events are in some cases the children’s only exposure to a farm. R.L. Frazier, county agent in Madison Parish, explained to youngsters attending Ag Adventures in Delhi in 2010, “Milk and ice cream don’t magically appear on the shelf; they come from a dairy cow.”

“These events are helping young people appreciate how agriculture improves their quality of life each and every day, and this is the overall goal of agricultural awareness initiatives across the state,” said Paul Coreil, LSU AgCenter vice chancellor for extension. “Knowing where our abundant, safe and healthy food, clothing and lumber for homes come from is important to all Louisiana citizens, especially young people who will be the future leaders of Louisiana.” ■

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A New Sugarcane Variety for Louisiana
L 03-371 released in 2010

Kenneth Gravois, Keith Bischoff, Michael Pontif, Jeff Hoy, T. Eugene Reagan and Collins Kimbeng

The next time you travel to New Orleans, look for the Jesuit church for Immaculate Conception Parish, which is on Baronne St. just off Canal St. and across from the Roosevelt Hotel, famous as the place where Gov. Huey Long stayed when in the city. This church sits on property once known as the Jesuit Plantation. The property is now the Central Business District of New Orleans. The Jesuit clergy managed the land on which they grew sugarcane, tobacco and some citrus. Jesuit priests are credited with the first successful establishment and culture of sugarcane in Louisiana in 1751. Little did they know that this humble beginning would lay the groundwork for a crop that contributes nearly $2 billion to the Louisiana economy each year.

The first sugarcane varieties grown in Louisiana were introductions brought from other parts of the world. In fact, Christopher Columbus is credited with bringing the first sugarcane to the New World on his second voyage. These plant introductions sustained the Louisiana sugar industry for its first 175 years.

Increasing yield losses due to disease problems necessitated the establishment of sugarcane breeding programs in Louisiana. The first part of conducting a sugarcane breeding program is to induce the plant to flower and to hybridize (cross pollinate) with another parent. The true seed (from the tassel) is germinated, and seedlings are transplanted into the field. This begins the process of rigorous field selection for high sucrose content, cane yield, disease resistance, insect resistance, erectness and many other traits that all come together to make a successful sugarcane variety. Variety development in Louisiana through crossing programs followed by field selection has been ongoing for more than 90 years.

L 03-371 – another in a long line of sugarcane varieties developed through crossing and field selection in Louisiana – was released on May 5, 2010, by the LSU AgCenter in cooperation with the U.S. Department of Agriculture's Agriculture Research Service Sugarcane Research Laboratory in Houma and the American Sugar Cane League. Variety release is the culmination of a multi-agency effort governed by the Three-Way Agreement, a document first signed in 1926 establishing a cooperative program among LSU, USDA and the League.

For L 03-371, photoperiod facili-

Table 1. Outfield variety trials conducted across south Louisiana comparing L 03-371 with other commercial sugarcane varieties in 53 combine-harvested trials conducted from 2007 to 2009.

Variety	Sugar Yield (lbs/acre)	Cane Yield (tons/acre)	Sucrose Content (lbs/ton)	Stalk Weight (lbs)	Stalk Number (No./acre)
Plantcane Crop (2007-2009) – 27 Locations					
LCP 85-384	7,444 -	26.4 -	280 -	1.98 -	27,097 -
Ho 95-988	8,683 -	31.4 -	275 -	2.33	26,981 -
HoCP 96-540	9,712 -	35.5	274 -	2.61 +	28,015
L 97-128	9,561 -	34.5	277 -	2.58	26,826 -
L 99-226	10,062	34.7	290	2.99 +	23,485 -
L 99-233	10,233	38.0 +	269 -	2.07 -	37,677 +
HoCP 00-950	10,352	34.9	297	2.32 -	30,386
L 01-283	10,213	36.1	283 -	2.25 -	32,775 +
L 01-299	9,487 -	34.5	274 -	2.21 -	32,729
L 03-371	**10,357**	**35.7**	**290**	**2.45**	**29,608**
First Stubble Crop (2008-2009) – 19 Locations					
LCP 85-384	6,639 -	24.8 -	270 -	1.64 -	31,018 +
Ho 95-988	7,911 -	29.0	274 -	2.06	28,608
HoCP 96-540	8,397	31.2	270 -	2.17	29,190
L 97-128	7,964 -	28.7 -	278	2.21	25,933 -
L 99-226	8,729	30.1	291 +	2.53 +	24,243 -
L 99-233	8,356	30.9	272 -	1.77 -	35,218 +
HoCP 00-950	8,681	28.9	301 +	1.84 -	31,428 +
L 01-283	8,934 +	31.4	286	1.80 -	35,327 +
L 01-299	9,599 +	35.9 +	271 -	1.88 -	38,401 +
L03-371	**8,596**	**30.6**	**283**	**2.15**	**28,679**
Second Stubble Crop (2009) – 7 Locations					
LCP 85-384	6,322 -	25.7 -	251 -	1.64 -	31,615
Ho 95-988	7,331	28.5	261	1.97	28,996
HoCP 96-540	6,860 -	29.1	244-	1.81	33,243
L 97-128	7,488 -	27.8	274	1.98	27,897 -
L 99-226	7,194	27.0 -	271	2.12 +	26,225 -
L 99-233	7,578	30.1	258	1.69	36,666
HoCP 00-950	7,422	26.8 -	282 +	1.73	31,045
L 01-283	8,601 +	32.7	267	1.73	38,393 +
L 01-299	8,570 +	34.1+	257	1.75	40,009 +
L 03-371	**8,026**	**30.8**	**266**	**1.89**	**33,218**

"+ or –" represent varieties with values that are significantly higher or lower than L 03-371, respectively.

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ties were used to induce flowering in the parental clones in the summer of 1998. The cross was made at the AgCenter Sugar Research Station on Oct. 9, 1998. The parents used for the cross were CP 83-644 and LCP 82-89. Early-stage selection culminated in the assignment of a permanent varietal designation L 03-371, in which the "L" indicates that both the cross and early-stage selection were done at the LSU AgCenter's Sugar Research Station, the "03" indicates the year (2003) the permanent number was assigned, and the number "371" is a consecutive number between 1 and 499 used by the AgCenter's sugarcane breeding program for unique variety identification.

The final stage of the sugarcane breeding program is referred to as outfield variety trials, which are conducted cooperatively by the three parties. Data from these trials include measures of sugar yield, cane yield and sucrose content. At the same time experimental clones are entered into the outfield variety trials, they are provided to the American Sugar Cane League for "seed" increase. This isn't actual seed but whole stalks because sugarcane isn't grown from true seed. Stalks from a plant are cut and planted, and buds along the stalks germinate and grow to produce new plants. This increase through cutting and planting of stalks, or "seedcane," is a process known as vegetative propagation. The American Sugar Cane League provides seed to any sugarcane grower requesting an allotment. Seedcane of L 03-371 will be made available to growers in late summer 2010.

Information from the outfield variety trials is reported for plant-cane through second-stubble crops (Table 1). In the plant-cane and second-stubble crops, L 03-371 had significantly higher sugar yield than HoCP 96-540, the most widely grown sugarcane variety in Louisiana in 2009. L 03-371 had cane yield values similar to HoCP 96-540 and higher sucrose content. The new variety is characterized as having a moderate population of large-diameter stalks. Harvesting characteristics are important for sugarcane varieties. L 03-371 can tend to lodge – or fall over as it reaches maturity – and is better suited to combine harvesting systems.

Disease resistance is another important aspect of variety selection. L 03-371 is resistant to smut, moderately resistant to brown rust and resistant to leaf scald under natural field infection. The new variety is resistant to sugarcane mosaic virus and sorghum mosaic virus. The effects of yellow leaf disease and orange rust on the yield of L 03-371 are unknown. Similar to all other varieties grown in Louisiana, this new variety may sustain significant yield loss in stubble crops from ratoon stunting disease. To realize the maximum yield potential of L 03-371, growers must plant healthy seedcane, free of ratoon stunting disease and other systemic diseases.

Resistance to the sugarcane borer is a key component of integrated pest management and is necessary for reducing the number of insecticide applications. L 03-371 is susceptible to the sugarcane borer. Field scouting – examining plants during the growing season – is a must to ensure timely insecticide applications based on economic thresholds. L 03-371 should not be planted where insecticides cannot be applied.

Louisiana's sugar industry continues to look toward the public sector for the development of new sugarcane varieties. L 03-371 has a high yield potential along with good resistance to Louisiana's major sugarcane diseases. The arrival of a new variety is a highly anticipated event. L 03-371 should pay big dividends in the future for Louisiana's sugarcane growers and raw sugar processors.

One would have to think that the Jesuit priests of 1751 would marvel at where sugarcane breeding efforts have taken this crop. ■

L 01-299 has excellent stubbling ability

On Aug. 28, 2009, sugarcane variety L 01-299 was released to the Louisiana sugar industry by the LSU AgCenter in cooperation with the USDA-ARS and the American Sugar Cane League.

The cross for L 01-299 was made on Oct. 22, 1996, at the Sugar Research Station. Early-stage selection culminated in a permanent variety designation in 2001. Variety testing began in 2002, and L 01-299 proved to be one of the top performers for the 2001 assignment series.

In 2008, it was decided to drop the variety from active testing and commercial consideration because of smut susceptibility in disease-screening trials. All parties agreed to obtain data in the third stubble crop of the outfield trials because earlier testing had highlighted good yield potential in older stubble crops. In 2008, the Louisiana sugar industry was pummeled by Hurricane Gustav. The new variety withstood the effects of the storm well, and L 01-299 did not lodge – or fall over at maturity – as severely as others. Coupled with outstanding third-stubble yields, it was decided to release the variety in 2009. Additional data collected in 2009 in third-stubble outfield trials again confirmed L 01-299's excellent stubbling ability.

Because sugarcane is a perennial crop, a farmer can grow multiple crops from a single planting. Extending the crop cycle by an additional stubble (ratoon) crop is an important factor affecting a grower's profit margin.

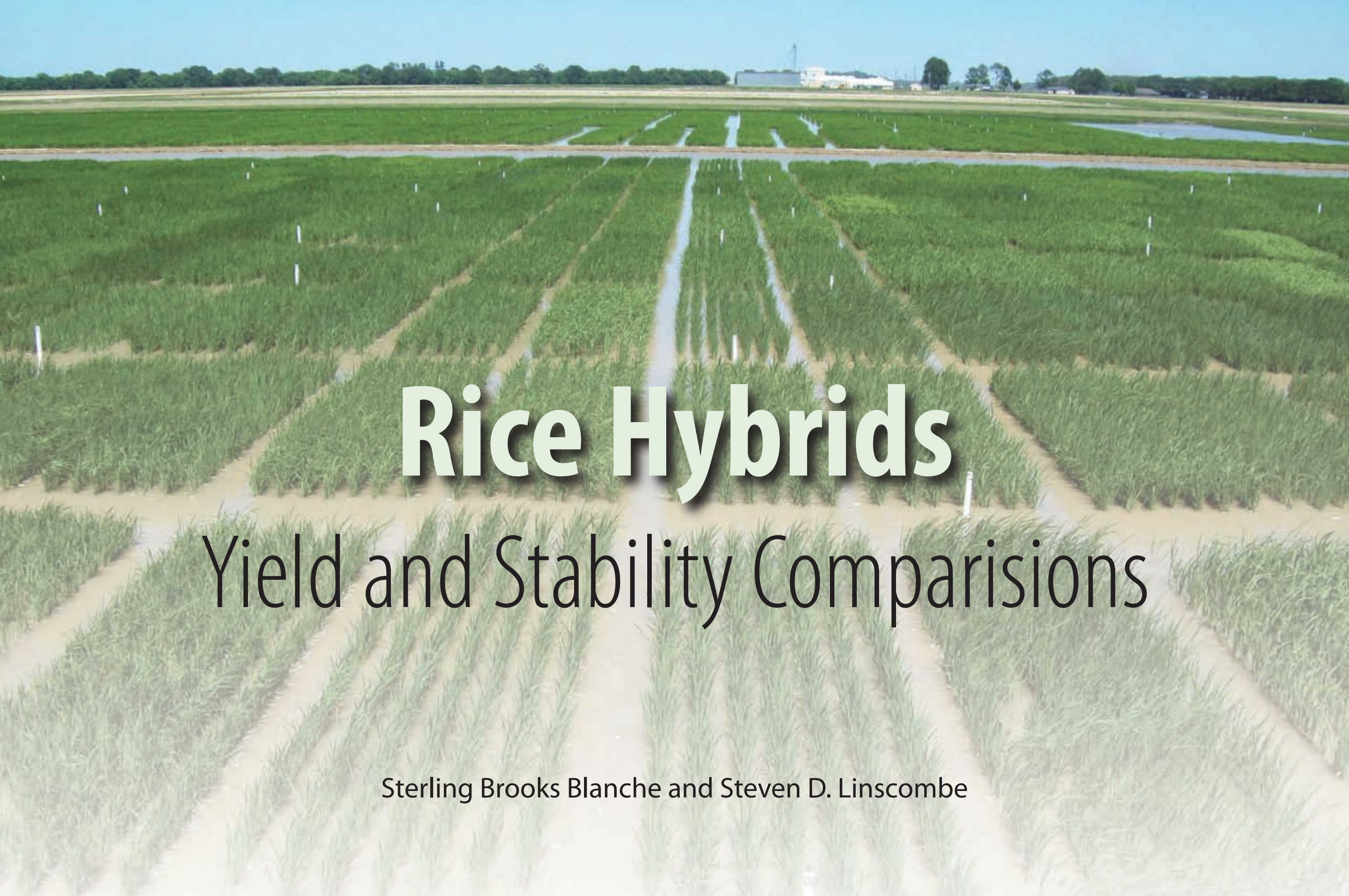
Sugarcane growers are advised to obtain high-quality seedcane from one of the seedcane companies to minimize the effect of smut and other systemic diseases in L 01-299. ■

Outfield Variety Trials comparing L 01-299 with other commercial sugarcane varieties in the third stubble crop from 2008 to 2009.

Third Stubble Crop – 5 Locations

Variety	Sugar per acre lbs/acre	Cane Yield tons/acre	Sucrose Content lbs/ton	Stalk Weight lbs	Stalk Number No./acre
LCP 85-384	5830 -	20.6 -	283	1.43 -	29043 -
Ho 95-988	6318 -	22.6 -	278 -	1.64	27912 -
HoCP 96-540	6479 -	23.5 -	281	2.01	23471 -
L 97-128	7498 -	26.4 -	288	1.97	27084 -
L 99-226	7813 -	25.6 -	307 +	2.21+	23322 -
L 99-233	7993 -	29.4	274 -	1.28 -	37756
HoCP 00-950	8157 -	27.0 -	304	1.68	32754
L 01-283	8313 -	28.3 -	295	1.57 -	36901
L 01-299	**9466**	**32.7**	**292**	**1.82**	**37021**

"+ or –" represent varieties with values that are significantly higher or lower than L 01-299, respectively.



Rice Hybrids

Yield and Stability Comparisions

Sterling Brooks Blanche and Steven D. Linscombe

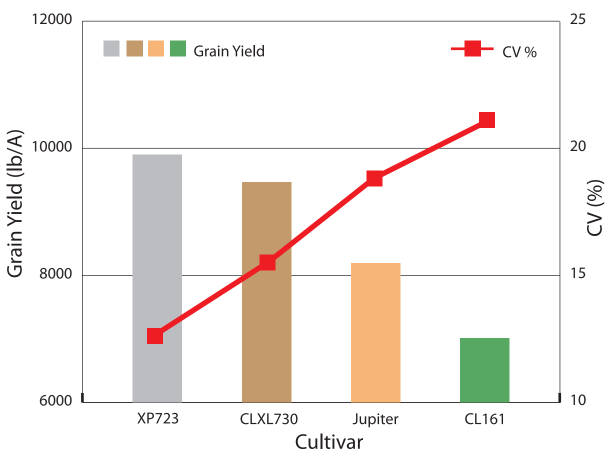
Since their introduction into the U.S. rice market, hybrid rice varieties have been grown on an increasing amount of Louisiana acreage. As a group, they have demonstrated excellent yield potential and disease resistance but lower milling yields and an increased incidence of lodging – or falling over before harvest. Improvements in yield potential, grain quality, milling quality and plant characteristics have resulted in increased adoption by Louisiana and other Midsouth rice producers. The expansion of hybrid rice acreage has been limited, in part, because hybrid seed is much more expensive than pureline varietal seed, and significantly higher yields are necessary for the economics to favor hybrid rice production.

On the genetic level, hybrid and varietal rice varieties are entirely different. Hybrid rice is created by fertilizing the female organs of one plant with the male pollen of a separate, genetically different plant. The resulting seed is harvested as uniform first-generation F1 hybrid seed containing half of its genetic material from each parent. Hybrid plants with different alleles (portions of chromosomes) from two distinct parents are referred to as heterozygous.

Pureline rice varieties are developed by crossing two distinct parents. Subsequent inbreeding is performed until the lines breed true, at which point they are considered to be homozygous inbreds. Homozygotes typically have identical alleles on both chromosomes. For these reasons, hybrid rice plants segregate in subsequent generations and yield a tremendous amount of variation in the progeny while varietal rice varieties remain similar as subsequent generations are grown.

Research in other crops has indicated that heterozygosity compared with homozygosity provides a stability advantage in terms of broad adaptation to multiple environments. Field studies were conducted at the LSU AgCenter Rice Research Station in 2005 and 2006

Figure 1. Mean rice grain yield and coefficient of variation (CV) for two hybrids (XP723 and CLXL730) and two rice varieties (Jupiter and CL161).



Sterling Brooks Blanche, Assistant Professor, Dean Lee Research Station, Alexandria, La.; and Steven D. Linscombe, American Cyanamid Professor, Rice Research Station, Rayne, La.

to compare rice hybrids and varieties for grain yield and milling quality to test this phenomenon in rice. For the experiment, stability was an estimate of how consistently varieties yielded across a diverse range of environments. Multi-location trials were conducted in 15 environments including the Rice Research Station and on-farm test sites in Evangeline, Vermilion, Acadia and Jefferson Davis parishes. A total of 13 varietal varieties (long-, medium- and short-grain rice) and two hybrid rice varieties were included in the analysis. Researchers were interested in both the mean performance and stability of rough rice yield and the percentage of whole, milled rice.

Grain yield of all varieties ranged from 6,759 to 9,902 pounds per acre. The two hybrid rice varieties, XP723 and CLXL730, had significantly higher rice yields than all inbred varieties (Figure 1). Jupiter, a medium-grain variety, was the highest-yielding of the varieties. For stability evaluations, the coefficient of variation (CV) was used to estimate the yield variation associated with each variety. A low CV suggests consistency across the 15 environments.

In evaluations of both grain yield and stability, hybrids were more desirable because of high grain yields and low CVs. Jupiter, with high yield potential and a relatively low CV, was the best option among varieties.

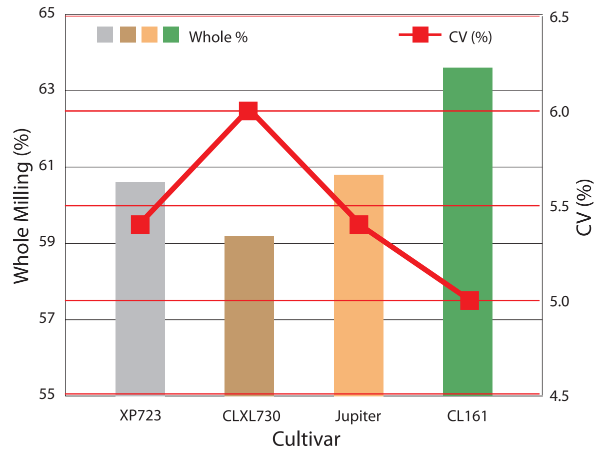
Whole, milled rice percentage is the proportion of whole, unbroken rice kernels remaining after the dehulling and milling processes. It affects the value of a rice crop. The highest milling yields were observed with the inbred varieties, and CL161 was among the best for high milled-rice percentage. The CV of CL161 was among the lowest in the test, suggesting it is a good candidate for high and stable milling yields. Milling yields of the hybrids were among the lowest and most variable in the study, particularly for CLXL730.

The hybrid varieties XP723 and CLXL730 exhibited higher rough rice yield than traditional inbred varieties and were consistent across the 15 environments included in the study. Their whole milled rice percentages, however, were among the lowest of all varieties. This suggests that to obtain maximum milling yields with hybrid rice varieties, harvest at the optimum time and moisture level is critical. A stable-milling variety, such as CL161, may be more resilient if inclement conditions prevent a timely harvest.

Ultimately, the profit potential of a hybrid or an inbred variety is the most important characteristic for rice producers. It should be noted that hybrid rice seed is more expensive than pureline variety seed; thus, a large yield advantage is necessary for hybrids to be economically competitive with rice varieties. Each system has advantages and disadvantages, and the decision should ultimately be based on specific variables such as planting date, the likelihood for a successful second crop and anticipated disease pressure. For example, hybrids are more likely to shatter (shed their grain prior to harvest) and lodge – which reduces yield, grain and milling quality, and harvest efficiency – during strong winds, whereas losses would be less in varietal rice after such an event. In addition to grain yield, economic factors such as price premiums or discounts because of grain and milling quality must be considered as well.

This study characterized rice varieties, including homozygous varieties and heterozygous hybrids, for rough rice yield and whole, milled-rice percentage and stability. Use of the CV provided a good understanding of the performance and level of stability of hybrid and varietal rice varieties across a diverse range of environments for two economically important traits. ■

Figure 2. Whole milled rice percentage and coefficient of variation (CV) for two hybrids (XP723 and CLXL730) and two rice varieties (Jupiter and CL161).



Photos by Sterling Brooks Blanche

Anthers are pollen-bearing structures that emerge from the floret during anthesis. Each rice flower in varietal rice is fertilized by pollen from the same flower (inbreeding). The pollen of male-sterile plants (used in hybrid seed production) is sterile, and fertile pollen must be contributed by another source, the male-fertile pollen donor.

Communities grow along with their gardens in Shreveport

LSU AgCenter agent Grace Peterson has helped start community gardens in Shreveport that help provide access to cheap, healthy food. Volunteers work at the Highland Community Garden.

Community gardens are blossoming in Shreveport neighborhoods and providing access to cheap, healthy food for the people who live there.

"We create community gardens, and we also create garden communities," said Grace Peterson, LSU AgCenter extension agent, who has been the driving force behind this project.

Peterson was hired in October 2007 to head up an effort to create vegetable gardens in predominately low-income neighborhoods to help people learn gardening skills as well as provide a source of fresh, nutritious food. She is funded through the Family and Nutrition Program, which is a federal program coordinated in Louisiana by the LSU AgCenter.

Back then, four community gardens were already under way.

"But they were mainly flower gardens," Peterson said.

Since then, six more community gardens have been established for a total of 10 in the program so far.

At first, she contacted local leaders in the neighborhoods about the benefits of community gardens. But once gardens were up and running and successful, people started coming to her with ideas for new gardens.

"I'm always looking to start more," Peterson said.

To help community leaders learn to organize garden efforts, she set up training sessions on leadership and organizational skills.

Because of these training sessions, the Red River Coalition of Community Gardeners was established, a group of volunteers that has helped multiply the efforts to set up and maintain community gardens.

"The coalition's mission is to create and maintain community gardens in the Shreveport-Bossier area, using sustainable practices, to grow healthy food, to provide education for healthy lifestyles and to empower people to share their unique contributions," Peterson said.

A new effort in the summer of 2010 was the establishment of a summer program called Fit for Kids at one of the Shreveport recreation centers. Twenty children, aged 10-14, participated.

Peterson said the youth learned to garden and cook the food from the garden. She also taught lessons on leadership. To show off what they had learned, the group created two short videos that Peterson posted to YouTube called "Planting Green Beans Shreveport, LA" and "Valencia Park Stoner Hill Youth Garden."

They also planned a spaghetti lunch and invited local dignitaries, including the mayor and city council members.

"Two TV stations showed up and did stories," Peterson said. ■ **Mary Ann Van Osdell and Linda Foster Benedict**

Photos by Mary Ann Van Osdell

Peterson helped youth in a summer recreation program learn to garden, which includes learning to make compost.

LSU AgCenter agents, scientists help seafood industry in recovery from oil spill

Crates of crabs sit on the bustling dock of Pontchartrain Blues, a crab processing facility in Slidell, La., on the shores of Lake Pontchartrain. Though business is down 70-80 percent because of the BP oil spill in the Gulf of Mexico, owner Gary Bauer is determined to stay open to keep his customers supplied and his labor force working.

"If I close my doors, those people would have left, and when they reopened the waters, I wouldn't have had anybody available to do the processing," Bauer said. "So I had a lot of motivation to keep the doors open."

Waters closed because of the oil spill were reopened to commercial crabbing, but not before Bauer started purchasing crabs from North Carolina to keep his business afloat. The long-distance haul severely cut into his profits.

"Keeps us treading water is what it did," he said.

Similar scenarios are playing out at docks across the Gulf Coast. Some processors haven't been as lucky as Bauer and have had to close because of lack of product.

Recovery money is yet to put a dent in damages. LSU AgCenter area fisheries agent Rusty Gaudé is working with the fishing community to help them navigate the recovery process.

"Thus far the claims against BP for the docks and processors have been woefully less than the actual losses they incurred," Gaudé said.

With additional waters open, more local seafood is available, but processors and fishers are still up against a negative public perception of seafood from the Gulf. Experts say rigorous testing has shown the oil spill has had little effect on seafood.

"In the seafood samples in open and closed waters where they're harvested to test, they haven't found any contamination. The reason why the waters were closed, they were closed as a precaution," said Jon Bell, an LSU AgCenter food scientist specializing in seafood.

A crate of crabs waits to be processed on the dock of Pontchartrain Blues.

Bell provides training on how sensory evaluation of seafood works while letting participants do "sniff tests" of samples of seafood spiked with petroleum and diesel.

Bauer attended a training session and now trusts sensory evaluation.

"It is amazing how easy it is for an untrained person like myself to pick up on the tainted product versus the fresh product," Bauer said. "It was an eye-opener."

Despite the challenges and hardships the oil spill caused, Bauer remains optimistic.

"We're going to come out of this just like we came out of Katrina," he said.

■ **Tobie Blanchard**

Photos by Frankie Gould

Workers sort crabs at Pontchartrain Blues, a crab meat processing facility in Slidell. Owner Gary Bauer says business is down 70-80 percent because of the BP oil spill in the Gulf of Mexico.

LSU AgCenter researcher

tackles food safety in produce

A quick way to test for salmonella in vegetable fields may be in the offing if research by an LSU AgCenter scientist proves its worth.

Working under a $40,500 grant from the Center for Produce Safety at the University of California Davis, Beilei Ge in the Department of Food Science is developing a test for contamination by foodborne pathogens in produce bound for the retail marketplace.

Foodborne pathogen detection relies heavily on microbe-culturing techniques, which are labor-intensive and time-consuming, Ge said. Although newly developed molecular techniques are an improvement, they still lack sensitivity, take a long time for analysis or require expensive equipment.

As one of the most common causes of foodborne disease outbreaks, salmonella is responsible for an estimated 1.4 million annual cases in the United States, according to the U.S. Centers for Disease Control and Prevention.

Current tests use a technique called PCR – or polymerase chain reaction – that detects salmonella based on DNA amplification, which increases the volume of DNA to a level high enough to detect easily. The process tests samples of fruits and vegetables for the presence of DNA linked to certain pathogens.

Ge has been been developing and evaluating a constant-temperature process that uses DNA amplification to duplicate target bacterial genes millions of times in only about an hour compared with PCR that often takes days, including a trip to a laboratory.

"The ability to quickly and accurately detect the presence of even low levels of harmful microbes is essential for food safety and biosecurity," Ge said. "An ideal detection method is rapid, sensitive, specific and cost-effective. PCR tests have to be sent to a lab and often return false positive results because they can't determine between live and dead salmonella."

Ge's technique measures DNA only from live salmonella because she uses a chemical that "binds" the DNA in dead cells so it isn't detected by the test. "The chemical is quite specific for dead salmonella cells but not live ones," she said. By combining these two elements – the DNA amplification method and a specific chemical compound – Ge's approach will be able to develop a new way to identify salmonella in produce.

Ge is working with a process initially developed in Japan and gaining use in the United States. Her LSU AgCenter lab is one of the first U.S. labs to adopt the technique.

The DNA amplification process Ge uses requires only one temperature – about 150 degrees – and the test can be done within an hour. Unlike the PCR technology that requires the produce sample be sent to a laboratory, Ge's technology could potentially be used in a grower's field.

"The test results are visual," she said. "You can tell by the turbidity of the sample whether you have a positive result. It also reacts to a dye and gives fluorescence to identify contaminated samples."

Ge is inoculating produce – cantaloupe, tomatoes and spinach – with salmonella and then checking how well the test can identify the pathogen. Her next step will be to test the process in production fields.

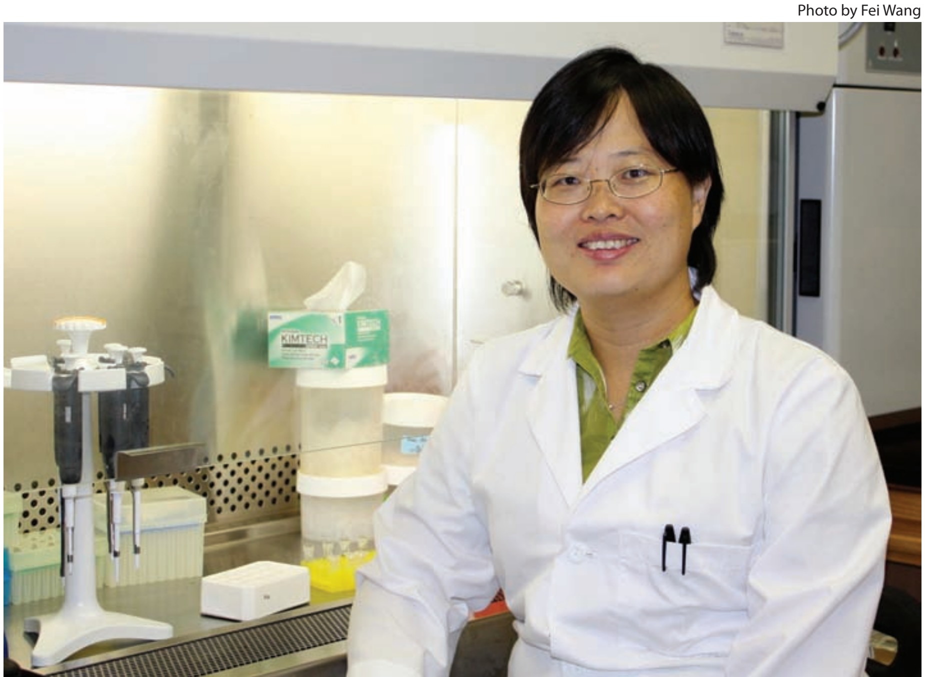
"We're currently evaluating the process in the laboratory," she said. "We're looking at how sensitive and specific the results can be." Because a test does not require complicated equipment and sophisticated technical skill, a field test would be feasible.

During her almost six years with the LSU AgCenter, Ge has used molecular detection to detect different bacterial pathogens. The current salmonella detection project is a collaboration with John Beaulieu, a plant physiologist with the U.S. Department of Agriculture's Southern Regional Research Center in New Orleans.

Besides detection research, Ge's laboratory also is involved in surveillance studies to examine the contamination levels, genetic makeup and antibiotic-resistance profiles of foodborne pathogens in various foods. She's also investigating genetic traits that contribute to the virulence and development of antibiotic resistance in foodborne pathogens.

■ **Rick Bogren**

Photo by Fei Wang



Beilei Ge in her laboratory at the LSU AgCenter in Baton Rouge, La.

Photo by James L. Griffin

Difficulties with CONTROLLING HENBIT *in Louisiana*

Bill Williams, Daniel Stephenson and Donnie Miller

In Louisiana, most row crops are produced on "stale" seedbeds, which means the fields are prepared in the fall, allowing vegetation to cover the field over the winter and help prevent soil erosion. In the spring before planting, the farmer treats the field with herbicide to control the weeds. More than 20 winter weeds are commonly found in fields before planting, and most are easily managed with a herbicide treatment. But others, such as henbit, ryegrass and cutleaf evening primrose, can be difficult to manage. Henbit is becoming one of the most challenging weeds to control before planting corn, soybean and cotton in northeast Louisiana.

Historically, the herbicide glyphosate combined with 2,4-D has formed the backbone of preplant weed control programs in Louisiana. Unfortunately, combinations of glyphosate and 2,4-D are not effective at controlling henbit. Residual herbicides such as Goal (oxyfluorfen), Valor (flumioxazin) and Resolve (rimsulfuron) have been used to improve henbit control. In 2008 and 2009, however, there were problems with re-growth indicating poor initial weed control.

One theory on why henbit has become a greater problem was that the presence of rust, a fungal disease that develops on henbit, reduces herbicide efficacy. However, research indicated that glyphosate plus 2,4-D performed better on diseased henbit than on henbit without rust.

Another theory tested was that henbit is more difficult to control after it flowers. Results from experiments were mixed. Research showed that fall applications of herbicides prevented re-growth when applied to henbit less than 2 to 3 inches tall.

The effects of adjuvant systems and varying rates of glyphosate plus 2,4-D also were evaluated. Adding a surfactant appeared to help but not enough to control henbit. Additionally, reducing glyphosate and 2,4-D rates below 1 pound per acre reduced henbit control.

Still in 2009, glyphosate plus 2,4-D at 1 pound of each per acre resulted in less than 60 percent henbit control. While products such as Goal, Valor and Resolve provide excellent residual henbit control, they do not appear capable of controlling large henbit plants.

Poor henbit control is not a statewide problem yet, but it has increased from a few isolated cases in Tensas Parish in 2008 to widespread problems in Concordia, Tensas, Madison and East Carroll parishes in 2009 and in Catahoula Parish in 2010. The reason for increasing problems with henbit is still unknown. It is suspected that henbit populations are becoming more tolerant to glyphosate plus 2,4-D. At the Northeast Research Station, henbit control from glyphosate plus 2,4-D averaged 80 percent five years ago but less than 30 percent – and often zero – in 2010. Henbit samples from other parts of the state and outside the state are needed for further testing.

Without help from glyphosate plus 2,4-D, residual herbicides like Valor, Goal and Resolve will not consistently control large henbit plants. LSU AgCenter weed scientists are evaluating programs for managing henbit but have not been able to identify a suitable program capable of consistently controlling henbit and other troublesome weeds such as cutleaf evening primrose. For example, programs based on glyphosate plus the herbicide Firstshot appear to be working well for henbit but often do not control cutleaf evening primrose. At this time, AgCenter data suggest that 2,4-D rates should not be reduced below 1 pound per acre. This is especially true in areas were glyphosate plus 2,4-D and a residual herbicide still work.

In fields were henbit control has not been satisfactory, fall or early-winter herbicide programs will work best. Programs based on glyphosate co-applied with Firstshot and a residual herbicide in late December or January have performed well. The key to these programs is to make the applications while cutleaf evening primrose and henbit plants are small. 2,4-D can be used to clean up escaped primrose 30 days before planting corn, cotton or soybean. The herbicides Ignite (glufosinate) and paraquat are effective at cleaning up any henbit plants that escape before planting.

Programs other than traditional glyphosate-based ones, such as those based on Ignite and paraquat, are being considered, but information on other weeds is limited. ■

Bill Williams, Associate Professor, LSU AgCenter Scott Research & Extension Center, Winnsboro, La.; Daniel Stephenson, Assistant Professor, Dean Lee Research & Extension Station, Alexandria, La.; Donnie Miller, Professor, Northeast Research Station, St. Joseph, La.

Ryegrass management *in Louisiana*

Bill Williams, Donnie Miller and Daniel Stephenson

Ryegrass, a popular cool-season forage, may be desirable in some pastures, but it is a serious weed in wheat and row crops. It can even be a problem weed in pastures if the focus is on maximizing summer hay production. Like henbit, ryegrass has been a growing problem for several years in many row crop fields. Unlike henbit, however, ryegrass is a statewide problem, and effective control measures are needed.

Resistance to the herbicide glyphosate is a strong suspect for the increased problems in controlling ryegrass before planting row crops. As with henbit, glyphosate has never resulted in 100 percent ryegrass control, so resistance is difficult to prove.

Bill Williams, Associate Professor, Scott Research & Extension Center, Winnsboro, La.; Donnie Miller, Professor, Northeast Research Station, Saint Joseph, La.; Daniel Stephenson, Assistant Professor, Dean Lee Research Station, Alexandria, La.

In 2008 and 2009, suspected glyphosate-resistant ryegrass samples were collected from a field in Franklin Parish (Figures 1 and 2). At the same time, ryegrass samples known to be susceptible to glyphosate were collected from a field at the Northeast Research Station in St. Joseph. Glyphosate at zero to 12 pounds per acre was applied to both populations when ryegrass was 6 to 8 inches tall with two to four tillers – shoots from the base of the plant. The amount of glyphosate required to reduce growth by 50 percent and dose responses were analyzed, and a seven-fold increase in glyphosate tolerance was observed in the Franklin Parish field compared with the Tensas Parish field. This is a strong indication of resistance. Every field in the state has not been tested for glyphosate resistance, but glyphosate resistance is likely in fields where this herbicide has failed to control ryegrass.

Several fall and spring programs have been evaluated for managing ryegrass before planting row crops. In fields where glyphosate resistance has not become a problem, producers may want to consider using the herbicide Resolve in their weed-eradication program. Resolve at 1.25 ounces per acre has been the only herbicide evaluated that improves ryegrass control when co-applied with glyphosate compared with glyphosate alone.

Ryegrass is a statewide problem, and effective control measures are needed.

When the herbicide applications are made in December or early January, growers can expect 10 to 20 percent better control when Resolve is added to glyphosate. Unfortunately, there is not an inexpensive program for managing glyphosate-resistant ryegrass, so it is imperative to stop the spread of resistant ryegrass.

In fields with heavy ryegrass populations, applications of the herbicide metolachlor before ryegrass emerges in the

Photos by Bill Williams

Figures 1 and 2. In 2008 and 2009, suspected glyphosate-resistant ryegrass samples were collected from a field in Franklin Parish.

fall should be considered. Fall applications need to be made in November and should be co-applied with the herbicides paraquat or Ignite to control emerged ryegrass. Applications in October have not performed well. A follow-up treatment may be required in the spring following the herbicides metolachlor or clomazone.

In spring, the herbicide clethodim – marketed as Select or Arrow – is rapidly becoming the standard for managing ryegrass. Satisfactory control has been observed with 6 to 8 ounces per acre of clethodim. However, 12 to 14 ounces per acre of clethodim are generally required for ryegrass control.

Clethodim is very susceptible to weed resistance, so producers are cautioned to use at least 14 ounces per acre. Reduced rates will quickly lead to clethodim-resistant ryegrass. The herbicides Assure, Fusilade and Poast have not been as effective as clethodim, but additional rates and timings need to be considered. After ryegrass develops seed heads, the herbicides paraquat plus diuron on cotton, metribuzin on soybean or atrazine on corn or grain sorghum are effective.

Once a crop is planted, options for managing ryegrass are limited.

Once a crop is planted, options for managing ryegrass are limited. In corn, programs based on the herbicide nicosulfuron (Accent or Steadfast Q) have provided the most consistent ryegrass control. However, there are fields where ryegrass resistant to sulfonylurea herbicides like nicosulfuron is suspected but has not yet been confirmed. Problems with suspected sulfonylurea-resistant ryegrass generally occur along railroad and highway rights-of-way. Nicosulfuron has not controlled ALS-resistant ryegrass. The only other option for managing sulfonylurea-resistant ryegrass in corn is 32 ounces per acre of Ignite in Liberty Link corn. Ignite will likely require multiple applications.

Other than tillage and directed applications of paraquat, glyphosate-resistant ryegrass cannot be managed after planting grain sorghum. In cotton and soybean, clethodim at 14 to 16 ounces per acre can be used to manage ryegrass. Multiple applications of Ignite also can be used on Liberty Link soybean or Liberty Link cotton. ■

Herbicide-Resistant Weeds

Another Limitation to Crop Production

(Continued from page 2)

include Palmer amaranth, tall waterhemp, common ragweed, giant ragweed, horseweed, Italian ryegrass and johnsongrass.

In Louisiana it has always been our contention that it was not a matter of if we would see the problem, but when. The delay in development of glyphosate-resistant weeds may be related to our cropping systems and weed control programs, which have included use of soil-applied herbicides at planting and combinations of glyphosate with other herbicides. The lag period has allowed us to learn from what has happened in other states and to aggressively educate producers as to potential problems and to promote weed control programs that prevent or delay development of glyphosate-resistant weeds.

LSU AgCenter weed scientists are evaluating several suspected cases of glyphosate-resistant johnsongrass, Palmer amaranth (pigweed) and tall waterhemp. Daniel Stephenson at the Dean Lee Research Station has just recently confirmed that Palmer amaranth collected from a cotton field in Concordia Parish is resistant to glyphosate, the first confirmed incidence of glyphosate resistance in the state. The Palmer amaranth population is highly resistant to glyphosate, and to obtain 50 percent control would require a rate almost four times that of the glyphosate use rate. To obtain 90 percent control of the resistant population would require a glyphosate rate almost 23 times the use rate. There is great concern as to the efficacy and cost of alternative control programs for Palmer amaranth and the ability to maintain crop yield potential.

Photo by James L. Griffin

This shows the response of the resistant Palmer amaranth to glyphosate rates, which are, left to right, nontreated control, 0.25x, 0.5x, 1x, 2x, 4x, 8x, 16x and 32x (x= labeled rate of glyphosate to control Palmer amaranth).

LSU AgCenter weed scientists are actively involved in identifying weeds resistant not only to glyphosate but also to other herbicides used in our diverse cropping systems. Once resistance is confirmed, it will be essential that effective alternative control measures are identified and that research-based education programs are developed and delivered to our clientele. ■

Roundup-Resistant Weeds in the Midsouth (http://www.weedscience.org/In.asp).

Resistant weed	Weed species	Year/State resistance confirmed
Palmer amaranth	*Amaranthus palmeri*	2005/Georgia and North Carolina 2006/Arkansas and Tennessee 2008/Alabama, Mississippi, Missouri
Tall waterhemp	*Amaranthus tuberculatus*	2005/Missouri 2010/Mississippi
Common ragweed	*Ambrosia artemisiifolia*	2004/Missouri and Arkansas
Giant ragweed	*Ambrosia trifida*	2005/Arkansas 2007/Tennessee 2009/Missouri
Horseweed	*Conyza canadensis*	2001/Tennessee 2002/Missouri 2003/Mississippi, Arkansas, North Carolina
Italian ryegrass	*Lolium multiflorum*	2005/Mississippi 2008/Arkansas
Johnsongrass	*Sorghum halepense*	2007/Arkansas

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