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LOUISIANA Agriculture

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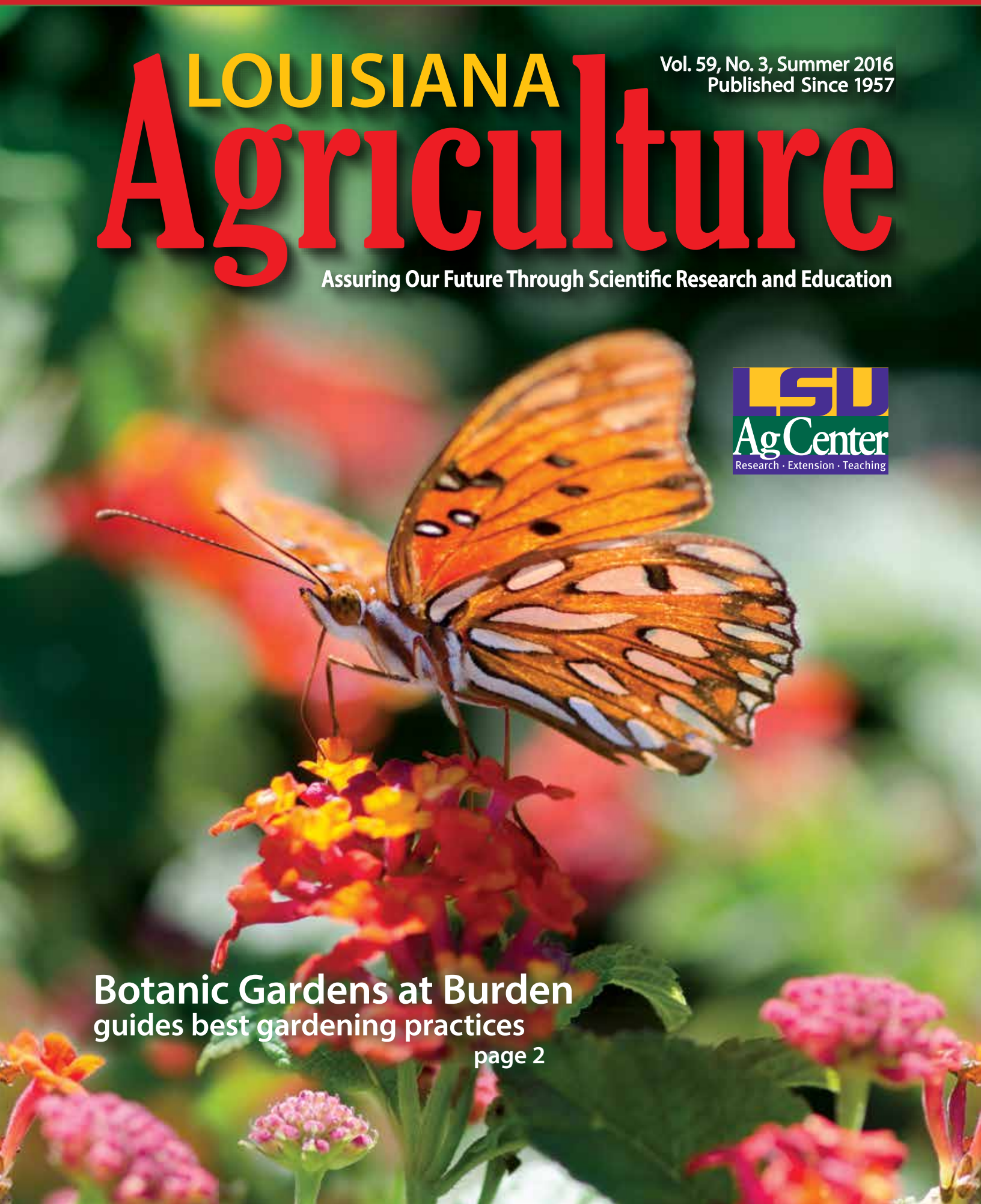

Botanic Gardens at Burden
guides best gardening practices

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Botanic Gardens at Burden
Provides Year-round Learning

Rick Bogren

The LSU AgCenter Botanic Gardens at Burden is home to a diversity of plant research and variety demonstration gardens and a naturalized woodlands research area that serve commercial agriculture and horticulture. In addition, the gardens serve the general public through the All-America Selections Garden, the rose garden, the herb garden and the children's garden with a new pollinator garden in the works. Visitors also can take advantage of the Trees and Trails program that provides more than five miles of serene walking paths through Burden Woods.

The Botanic Gardens also offers an abundance of public events throughout the year.

Each winter, the Botanic Gardens celebrates Arbor Day. A highlight in recent years has been the opportunity for visitors to plant a tree to help reforest Burden Woods, which was damaged by Hurricane Gustav in 2008. Each individual and family who plants a tree is given a certificate with GPS coordinates so they can monitor the growth of the tree they plant.

Each spring the Brush with Burden Art Exhibition features a juried multimedia exhibition of art inspired by Louisiana's natural beauty. It's preceded by a special seminar presented by a renowned artist.

Later in spring, the Botanic Gardens presents Gourmet in the Garden, which features tastings from award-winning local chefs accompanied by craft cocktails and live music in the gardens and pavilion. And in the fall, the Botanic Gardens invites visitors to Wine and Roses, an elegant evening of dining and dancing under the stars and among 2,000 roses.

In June, Garden Fest visitors can enjoy a hayride to taste local produce and learn about the latest in vegetables and ornamental plants and sample foods from local culinary schools and food companies in the LSU AgCenter Food Incubator.

Each Saturday during October, the Corn Maze features activities that include a farm animal petting zoo, hay mountain climb, kids zip line, hayride and a giant slingshot. The event culminates on the final Saturday with a bonfire.

> . . . home to a diversity of plant research and variety demonstration gardens and a naturalized woodlands research area that serve commercial agriculture and horticulture.

In December, the public can view some of the latest varieties of poinsettias and vote on the favorites. More than 1,000 are on display and available for sale. And Christmas at Burden offers the opportunity to make a gingerbread house and for children to have breakfast with Santa.

Throughout the year, the Children's Garden Series at the Botanic Gardens presents programs for children ages 6-10 to participate in fun, interactive activities and learn about gardening. And StoryTime at Burden sponsored by the Junior League of Baton Rouge features storybook readings and imagination-themed activities for children ages 3 to 8.

Many of the events in the Botanic Gardens are conducted in cooperation with the Burden Horticulture Society with proceeds used to educational programs. The facilities are home to the East Baton Rouge Master Gardeners and also play host to a variety of local horticulture organizations and societies for regular meetings and plant shows and sales like those by the East Baton Rouge Master Gardeners, the Camellia Society and the Baton Rouge Orchid Society. And week-long Byzantine Icon Workshops teach "writing the icon," an art form since the early days of Christianity.

Rick Bogren is a professor and associate editor of Louisiana Agriculture.

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LOUISIANA Agriculture

ON THE COVER: The Gulf fritillary, the official state butterfly of Louisiana, feeds on the blossoms of a lantana. Butterflies feed on nectar plants, such as the lantana, and also perform as pollinators, transferring pollen from one plant to another. A new pollinator garden is in the planning stages for the LSU AgCenter Botanic Gardens at Burden. You can read the Burden story on page 30. Photo by Kathy Kramer

AgCenter NEWS

Economist wins MarketMaker award

LSU AgCenter economist John Westra received the Farm Credit MarketMaker Innovation Award at the Annual National Value Added Agriculture Conference in July in Madison, Wisconsin. This award recognizes his efforts to help the Louisiana economy through MarketMaker, which is a national network of states that employ interactive technology and information to connect farmers and fishers with food retailers, grocery stores, processors, caterers, chefs and consumers.

Mosquito control-related bee kills are avoidable

Good communication between mosquito control operators and beekeepers and proper mosquito control techniques can prevent massive bee kills, according to LSU AgCenter entomologist Kristen Healy. She has conducted extensive research evaluating the effects of pesticides on honeybees and has determined that when done properly, mosquito control has minimal effects on honeybee health.

In her study, Healy conducted field trials using sentinel beehives in areas that received frequent applications of mosquito control pesticides and in areas that received no applications. The researchers counted average numbers of dead bees at all hives and did not see any increased mortality because of mosquito control activities, Healy said. Researchers also measured stress by analyzing indicator enzymes from the field-test bees and found no difference in stress between the two groups.

Beekeepers can minimize exposure to pesticides, Healy said, by requesting to be part of a no-spray zone or covering their hives with tarps during spraying.

Flood damage to agriculture rises to $277 million

Samuel Buller, who farms near Port Barre, holds a rice plant with rice that has sprouted after the 48-acre field had fallen over into floodwater. Buller, 21, farming for the first time on his own, said the rice fell over because the panicles were loaded with a good crop, but he was able to harvest a few other fields between rains. Buller's yields are reduced, grain quality will suffer, and about a third of the plants in a 280-acre field fell over and sprouted. "It was some of my best-looking rice," he said.

His story is just one of many. LSU AgCenter economist Kurt Guidry estimates that the August 2016 flood in south Louisiana will cost farmers $277 million. That means Louisiana's agriculture industry has lost at least $367 million of crops, livestock and equipment to floods in 2016. Before the August flood, north Louisiana farmers suffered $90 million of damage during flooding in March.

"These impacts will likely create significant financial challenges for many agricultural producers who were already under considerable financial stress resulting from low commodity production in 2015 and low commodity prices in both 2015 and 2016," Guidry said.

The estimates account for production losses, quality damage, increased production costs and infrastructure damage and losses. AgCenter county agents gathered parish-level data that Guidry used in his calculations.

The majority of the $277 million impact comes from reduced yields along with quality losses that render crops unmarketable, Guidry said.

Lamendola inducted into National 4-H Hall of Fame

Stanley Lamendola, a former assistant director of the LSU AgCenter's 4-H and youth development program, is one of 16 people across the nation to be inducted into the National 4-H Hall of Fame in 2016. Growing up, he was a member of his 4-H Club in St. James Parish. He started his extension career as a 4-H agent in Avoyelles Parish and later held positions including community resource development agent, district agent and assistant director for field operations and 4-H youth development. As assistant director, Lamendola sought to expand the use of Camp Grant Walker, the 4-H facility in Pollock. He was in charge of remodeling the campgrounds and acquiring an additional 1.5 acres of land. The project added sidewalks, outdoor speakers and landscaping, and converted an old cafeteria into classrooms. Lamendola was the first president of the Louisiana Association of Extension 4-H Agents and spent more than two years in Malaysia to establish agriculture and youth education programs. Lamendola was inducted into the Louisiana 4-H Hall of Fame in 2010.

Two plant pathologists receive fellow awards

LSU AgCenter plant pathologists Raymond Schneider and Lawrence Datnoff were elected Fellows of the American Phytopathological Society and received their awards at the professional organization's annual meeting in Tampa, Florida, in July.

Schneider is a professor who works in soybean pathology, concentrating on diseases such as soybean rust. He was the first to find rust in Louisiana in 2004, which was its first discovery in North America. The APS recognized Schneider as a research pioneer because he helped develop a better understanding of the biology and genetics of fungal diseases such as *Fusarium oxysporum* and *Cercospora kikuchii* and introduced novel ways to control root diseases. The society also recognized his commendable teaching career. Schneider has published extensively in the area of disease management in soybeans and other crops. Before coming to the AgCenter in 1984, he worked at the International Institute for Tropical Agriculture in Ibadan, Nigeria, on a Ford Foundation Fellowship.

Datnoff is a professor and head of the Department of Plant Pathology and Crop Physiology. In awarding Datnoff the fellow honor, the society cited his high-impact research on multiple crops and pathosystems and his pioneering use of silicon to improve plant health and suppress plant diseases. The society also noted that as department head, Datnoff has promoted and expanded the vision of graduate student education to go beyond traditional classroom and individual research activities. Datnoff has conducted research in Spain, Japan, Colombia and Brazil and has an extensive list of publications and academic distinctions.

Boldor lead scientist on $4 million NSF grant

LSU AgCenter researchers are part of a team of scientists at LSU and the University of Kentucky who received a $4 million grant from the National Science Foundation Experimental Program to Stimulate Competitive Research.

Dorin Boldor, associate professor in the Department of Biological and Agricultural Engineering, is the lead scientist on the grant. The team will work to create a new class of materials made from lignin, a byproduct of the biofuels, pulp and paper, and sugarcane industries. The scientists hope to develop a process to deconstruct the complex structure of lignin into simple molecules, then reconstruct it into macromolecules that can be used for a variety of purposes. The resulting materials, which would include thin films, membranes and nanoparticles, could have biomedical or industrial applications, such as water purification and energy storage or the creation of new types of antimicrobials.

Kenneth W. Paxton, 1942-2016

Kenneth W. Paxton, a 40-year faculty member and former head of the Department of Agricultural Economics and Agribusiness, passed away Aug. 23. He was 74 years old. Paxton joined the faculty at LSU in 1971 after receiving his doctorate at the University of Tennessee. He retired as professor emeritus in 2011 and was named the LSU College of Agriculture Outstanding Alumnus that same year. He earned both his bachelor's and master's degrees at LSU. His main area of research was the economics of cotton production, and he authored more than 200 articles and publications. He published many articles in *Louisiana Agriculture* and was on the editorial board in 2003-2005. He was active in numerous college, campus and professional organizations, holding officer positions in Alpha Zeta, Gamma Sigma Delta, the American Society of Farm Managers & Rural Appraisers, Red Stick Forestry Association, the Southern Agricultural Economics Association and the American Agricultural Economics Association.

Group from Portugal visits Sweet Potato Station

A group from Portugal came to the Sweet Potato Research Station in Chase during July to tour the station and receive updates from the scientists on their research. The leader of the visiting group was Miguel Godinho, left, product manager for Heart Potato, a potato production company in Portugal. Second from left is Myrl Sistrunk, extension sweet potato specialist. Others in the photo, left to right, are Joao Sol and Jose Pereira, both from Portugal, and Tara Smith, AgCenter Northeast Region director and research coordinator at the station. Part of their itinerary was a trip to the ConAgra Lamb Weston Sweet Potato Processing Facility in Delhi. The group also toured the Black Gold Farms in Delhi as well as two other sweet potato operations.

"We had a great interactive visit," Smith said. "They heard updates from all of our research programs, and we learned about their operations as well."

Del Monte explores opportunities for sweet potatoes

Representatives from Del Monte Foods Inc. visited and toured the LSU AgCenter Sweet Potato Research Station in Chase in June to explore opportunities for Louisiana sweet potatoes as part of their canning sector industry.

During the visit, Arthur Villordon, left, AgCenter researcher, explains sweet potato development to Stewart Higgins, director of raw products; Paul Williams, root crop buyer; and Mark Fields, kneeling, of Del Monte's division in Siloam Springs, Arkansas. Del Monte is one of the largest distributors and marketers of food products for the U.S. retail market.

Company officials discussed their intent to refocus and intensify efforts on sweet potato production and processing and the need for cooperative research efforts to address varietal and production needs facing the canning sector.

The group also visited Deshotel Farms in Bunkie.

"We welcome and are encouraged by the opportunity to work with Del Monte Foods Inc. to address sweet potato production issues and continue to contribute to the overall growth and sustainability of the sweet potato industry," said Tara Smith, AgCenter Northeast Region director and coordinator of research at the station.

College of Ag NEWS

Stout named new entomology department head

Michael Stout, a 19-year veteran with the LSU AgCenter and LSU College of Agriculture's Department of Entomology, is now head of the department. Stout, who received a Ph.D. from the University of California, Davis, came to LSU in 1997 as a rice entomologist. His research focuses on helping rice growers manage pests in their fields. He will continue to conduct research on plant-insect interactions and teach a course on plant resistance. The Entomology Department has 14 faculty members and 35 graduate students. The department also educates undergraduates through general education courses and a minor in entomology.

High school students get look at agriculture

A drone hovers in front of participants in the first Governor's School for Agricultural Sciences, a residential program for high-achieving high school students held on the LSU campus in Baton Rouge. The students learned how drones are used in agriculture as part of their activities during the school, held July 11-15. Leslie Blanchard, assistant dean of the LSU College of Agriculture, said the school helps students learn about agricultural subject areas such as business, environmental management, plant and soil systems, animal science, and nutrition and food sciences, as well as career options in agricultural sciences. Tours included Tiger Stadium with a discussion on turfgrass management; Bracy's Nursery, a large wholesale nursery in Amite City; Zen-Noh Grain, a grain elevator in Convent; and the LSU AgCenter Aquaculture Research Station. The program also included a leadership workshop with strategizing and problem-solving activities.

Student finds fashion inspiration in China

Sakeenah Ashiru named her mini-clothing collection "Midnight in China." The name is more than a passing nod to the Asian influence seen in the rich red and black brocade or silky floral fabrics she chose for her garments. Ashiru, a junior in the LSU College of Agriculture majoring in textiles, apparels design and merchandising, spent many late nights working on the dresses, tops and skirts for her collection in the city of Wuxi, Jiangsu Province, China, during a year-long study abroad program at Jiangnan University.

Ashiru, originally from Lagos, Nigeria, wanted to experience fashion design in another culture so she looked into different programs and decided on Asia. Chuanlan Liu, an associate professor in the department, who is originally from Beijing, helped Ashiru navigate the process of picking and applying to a program.

The language barrier did not deter Ashiru. Classes were in Mandarin Chinese, a language she did not speak. She said other students in the class helped translate for her until she began picking it up.

"A global viewpoint is important in the fashion industry. This was a valuable experience for her long-term growth and development as a designer," Liu said.

Scholarship honors first female agronomy graduate

Peggy Laborde, the first woman to graduate from the LSU College of Agriculture with a degree in agronomy, established a scholarship in plant and soil systems named after her and her late husband Lucien. Peggy Laborde, then Nolin, graduated in 1947, during a time when few women enrolled in traditional production agriculture programs at LSU. She and her husband established Hamburg Mills Farm, where they grew white clover and raised cattle. There they raised their four children: Laura, Luke, Janine and Thomas, all of whom graduated from LSU with degrees in agriculture.

In the spring of 2016, 75 percent of the students enrolled in the College of Agriculture were female – quite a shift from when Laborde, who turned 90 on Aug. 10, attended LSU.

Students help with flood clean-up

Members of the Wildlife Society LSU Student Chapter volunteered to help clear and gut a home in Prairieville that flooded in August. Luke Laborde, instructor in the School of Renewable Natural Resources, helped organize the effort. Anna West, the chapter's co-president, said the group was eager to help.

"I wanted members who may not be from Louisiana or understand the damage of the floods to see firsthand the damage and have an opportunity to make a difference in a community they've grown to love while attending LSU," West said.

The students worked in Arthur and Catherine Cazes' house. They helped gut the kitchen, removed insulation from under the house and cleaned out a storage unit. The homeowners said they were astonished at the amount of work the students accomplished.

"They performed all tasks with the utmost sincerity," Catherine Cazes said. "They are miracle workers."

The students are in back left to right, Tyler Bivens, Brad Frazier and Tyler Tompkins. In front left to right are Marisa Saladino, Dana Bryant, Colette Pansini, Anna West, Rohit Kalvakaalva and Katie Caldwell.

New Faculty PROFILE

Clay Stroud, Cassandra Skaggs and Jacqueline Satter, students in the LSU College of Agriculture, attended the 2016 North American Duck Symposium in Annapolis, Maryland, with Kevin Ringelman, assistant professor and waterfowl ecologist.

Waterfowl Research Returns Ringelman to His Roots

Tobie Blanchard

Kevin Ringelman developed his interest in waterfowl on the plains of Bismarck, North Dakota. Ringelman, an assistant professor and waterfowl ecologist with the LSU College of Agriculture, grew up hunting and learning about ducks in that region.

Waterfowl is also part of his legacy.

"My dad spent his entire career working with waterfowl, so it was a natural fit for me," Ringelman said.

Ringelman received his bachelor's degree from Cornell University and his Ph.D. from the University of California at Davis. He joined the College of Agriculture's faculty in August 2014.

Ringelman's research has him returning to his roots while also learning more about waterfowl wintering in Louisiana.

"My research is split between issues in Louisiana and breeding grounds in North Dakota," he said.

Ringelman has a master's student in North Dakota working on a project to study how fracking—a technique used in the energy industry to extract oil and gas from rock by injecting high-pressure mixtures of water, sand or gravel and chemicals—is affecting breeding, nesting and duckling survival. Another student is studying lesser scaup diving ducks on Lake Pontchartrain.

Ringelman said the fracking activity in North Dakota may have affected waterfowl in several ways.

"They may find quieter places to nest, so we may see fewer pairs, but the fracking may be affecting predators so nesting success could be higher," Ringelman said.

Fracking could lead to lower duckling survival, Ringelman said, because brine contamination in wetlands could kill the insects that ducklings eat, affecting their food supply.

Ringelman also plans to have a Ph.D. student lead a study at Rockefeller Wildlife Refuge in Cameron Parish on mottled duck adult survival during the breeding season.

Being in Louisiana affords Ringelman many research opportunities because that state is a wintering area for waterfowl.

Ringelman takes some of his classes out in the field for hands-on wildlife activities. Next spring, he plans to have the class help capture ducks using rocket nets and band them. They'll also get to observe veterinarians implant radio transmitters in waterfowl.

"I'm very impressed with the undergraduates here. They want to stay out in the field longer. They are just so enthusiastic about being outside," he said.

Assistant professor and waterfowl ecologist Kevin Ringelman, left, with students on a field trip to Alexander State Forest in Woodworth, Louisiana.

Tobie Blanchard is a communications specialist and communications coordinator with the College of Agriculture.

Food Incubator

Celebrates Three Years of Success

Olivia McClure

When the idea for the LSU AgCenter's Food Incubator was first hatched in 2012, there was no facility in Louisiana where people who wanted to pursue the daunting journey of starting a food business could go for expert advice and production equipment.

In the past three years, the Food Incubator has filled that void, serving as a "one stop shop" for people looking to turn their recipes into profitable, successful businesses.

The incubator officially launched in July 2013 with just 10 tenants and now offers services to 35 tenants — with more on a waiting list — who make 67 different products in the incubator's facilities.

The incubator has become a vital resource for Louisiana food entrepreneurs who otherwise would have to go out of state to find technical expertise and kitchen facilities to make their products, said Gaye Sandoz, director of the incubator. It has helped people turn old family recipes and creative new ideas alike into viable businesses that have found receptive audiences around Louisiana.

"Buying local is trendy now," Sandoz said. "The customers feel it's healthier and safer because they know the source, and they want to support the community."

The impressive roster of products made by incubator tenants includes everything from salad dressings and barbecue sauces to candies and gelato. Many of the products are sold at local farmers markets and stores across Louisiana and the South. Some tenants have found an even bigger audience through online orders shipped around the country.

Success stories are abundant at the incubator, Sandoz said, noting that the initiative has helped create 30 full-time and 50 part-time jobs.

There's Richard Hanley, one of the incubator's first tenants whose salad dressings have made it onto store shelves in multiple states. There's Alvin Ray, who today has a full-time job making and selling his popular sweet and spicy Bayou Best pickles — something he once did just for friends and family after coming home from his old job as a maintenance man. And there's Mario Lozanov, a former organic chemist who now oversees a small empire of carts around Baton Rouge that sell his City Gelato, which is also available in several supermarkets.

Four tenants, including Hanley and Ray, have graduated to co-packers, which are facilities that entrepreneurs contract with to manufacture products on their behalf. Being accepted by a co-packer allows tenants to ramp up production and fulfill the ever-growing demand for their products.

LSU's Louisiana Business and Technology Center Business Incubator — which helps entrepreneurs, including LSU students, start small businesses — was instrumental in getting the Food Incubator off the ground in 2013, said Sandoz, who had worked at another food business incubator in Norco, Louisiana, that has since closed.

In the incubator's first year, its handful of inaugural tenants made 3.5 tons of products using a couple of small kettles, a bottler and a few other pieces of equipment in a renovated space in Clyde Ingram Hall on LSU's campus. In 2014, production jumped to 21 tons, then more than doubled to 44 tons in 2015.

Since opening, the incubator has expanded, adding more and larger equipment to accommodate the growing list of tenants and to help them satisfy increasing demand for their products. Incubator tenants can also take advantage of kitchen facilities in the new Animal and Food Sciences Laboratories Building, which opened in August 2014.

"I know we wouldn't be where we are today without the facilities and the personnel with the incubator," said Abigail Ricks, who makes Old Soul Pickles at the incubator.

"To take something from a homemade product and bring it to a bigger scale is something that if you don't have any experience and you're a home cook, you might not have any idea where to start," Ricks added. "But by using the food sci-

The LSU AgCenter Food Incubator team includes from left to right, front row, Pitchayapat Chonpracha and Valentina Rosasco, both graduate studenta. Second row, Matthew Ulmer, recent graduate in food sciencea; Gabriela Crespo, food scientist; and Marvin Moncada, food scientist. Back row, Luis Espinoza, food scientist; Ashley Gutierrez, food scientist; Gaye Sandoz, incubator director; and Adam Lofaso, undergraduate student. Photo by Olivia McClure

Lili Courtney, center, works with her son, Lloyd Courtney, left, to package bottles of her Delightful Palate salad dressing at the LSU AgCenter Food Incubator. Photo by Olivia McClure

The incubator has become a vital resource for Louisiana food entrepreneurs.

entists and Gaye Sandoz, who is a wealth of knowledge, we've been able to maintain the quality of our product and even improve it."

The incubator's staff includes four food scientists — Luis Espinoza, Marvin Moncada, Gabriela Crespo and Ashley Gutierrez — who help tenants adjust their recipes so they're shelf stable and safe. They also help both tenants and other food entrepreneurs reformulate recipes to create improved or entirely new products, like ones that use only natural products.

In the process, the tenants often learn more about the food industry and their own products, Sandoz said. They learn about the functions of certain ingredients and work with the scientists to find ways to cut production time and be more efficient.

It's important for tenants to know their products well so they can successfully market them, Sandoz said. She encourages tenants to do in-store demonstrations and sell their products at farmers markets where they can interact with customers and learn more about their preferences. Technologies like social media and email newsletters can help them keep in touch with customers to develop a loyal fan base.

"If you can't market, you shouldn't start a food business," Sandoz said. She often reminds tenants that they are most qualified to tell the story of their product — a strength they should leverage when talking to customers.

The incubator's four student workers and one graduate assistant are also available to help tenants throughout the production and marketing processes, which offers valuable real-world experience in many aspects of the food industry.

Trey Bacon, who makes Tres Bien Que barbecue sauce with his mother, said incubator equipment like heated kettles and a bottler have allowed him to make more sauce faster so he can meet growing demand for the product. The incubator staff has also helped him navigate health regulations and make sure his barbecue sauce is safe — tasks that can be difficult for newcomers to the industry, but are necessary to do retail sales.

"Our store presence alone exploded once we were able to say we were made in the LSU AgCenter Food Incubator," Bacon said. Before coming to the incubator, his sauce was sold in just a couple of stores. Now, it's available in 25 stores, he said.

Linda McAdams, of Truly Southern Pretzel Crunch, said the incubator has helped her family's product reach the shelves of about 80 stores in south Louisiana and a few other states in just a year and a half. She said that kind of success wouldn't be possible without the guidance she's received from Sandoz, the food scientists and other tenants.

"It's an unbelievable experience to have this right in our own backyard, and I think that so many other cities around the country would benefit from this," McAdams said. "I know not everybody knows about it, and we take the opportunity to let people know how fantastic a program it is and the amazing results we get. We cannot thank the staff enough because they always go above and beyond for us."

Olivia McClure is an assistant specialist with LSU AgCenter Communications.

In the incubator's first year, its handful of inaugural tenants made 3.5 tons of products . . . In 2014, production jumped to 21 tons, then more than doubled to 44 tons in 2015.

Matthew Broha uses a kettle to make Ruth's Recipes hummus at the LSU AgCenter Food Incubator. Broha's mother, Kathy Broha, started Ruth's Recipes and is one of the original tenants of the incubator. Photo by Olivia McClure

Master Gardener Program

Continues to Change and Grow

Linda Foster Benedict

Sixteen people showed up at 8:30 a.m. on July 7 at the LSU AgCenter Botanic Gardens conference center for the first of 16 sessions of the new Louisiana Master Gardener class in East Baton Rouge Parish.

They were representative of a typical Master Gardener class offered across the state in 26 programs covering 58 of Louisiana's 64 parishes. Most were female, 12, and most were retired, 13. All professed a love of gardening and a desire to learn more.

"Gardening in Louisiana is different from anywhere else," cautioned their teacher, Miles Brashier, an AgCenter extension agent and horticulture specialist. "There are two seasons – hot and hotter than hell."

Brashier, who retired from the AgCenter as an extension agent in Pointe Coupee Parish in 2015, has been hired back a couple of days a week to help with the Master Gardener program. He assured the group that by going through this class, they would gain enough knowledge to not only be better gardeners themselves but be able to help others with their gardening questions and concerns.

One of the principal goals of the Master Gardener program is to build a cadre of highly skilled volunteers who can extend the reach of LSU AgCenter extension agents and specialists and help address the demand for horticulture information, Brashier said.

Currently, there are about 2,800 active Master Gardeners across the state. Since the nationwide program started in Louisiana nearly 22 years ago, about 3,500 Louisianians have been certified as Master Gardeners.

The training includes 45 hours of instruction on plants, soils, landscaping, and garden pest control. After the students pass a test and are certified as Master Gardeners, they are to commit to 40 hours of volunteer service during the year following the training, with an additional 20 hours per year from then on, Brashier said.

They also have to earn six hours of continuing credit each year to maintain their certification.

"We have one volunteer who has logged 10,000 hours of service," said Skippy Berner, the president-elect of the East Baton Rouge Master Gardener Association, who also spoke to the group on opening day, adding that this person had been a Master Gardener for 20 years.

Vicki Anderson, a member of the Master Gardener class in East Baton Rouge Parish, shows her completed tray of plants. Photo by Linda Foster Benedict

It's easy to get the service hours, Brashier said, because of the popularity of gardening across the state. Master Gardener groups do a variety of projects:

- Put on plant clinics at fairs, garden shows and nurseries where people can get a diagnosis for problem plants.
- Conduct plant sales to raise money for scholarships and community projects.
- Work with teachers to plan school gardens.
- Answer questions called into LSU AgCenter parish extension offices.
- Give talks at garden clubs and libraries.
- Spearhead community garden and beautification projects.

Among the newest projects for the East Baton Rouge group is a children's garden at Our Lady of the Lake hospital, Berner said. The group also has been asked by Louisiana's First Lady, Donna Edwards, to help with the landscaping and gardens at the Governor's Mansion.

Some Master Gardeners use their training as a springboard for other activities. For example, in the East Baton Rouge Parish class, Darrell Patterson, of Baton Rouge, a recent retiree from Dow Chemical, has bought a farm in Gloster, Mississippi, where he intends to raise

Members of the Master Gardener class in East Baton Rouge Parish are, left to right: Darrell Patterson, Sharon Davis, Helen Campbell, Andre Brock, extension agent in West Feliciana Parish, who taught the propagation lesson, and Linda Medine. Photo by Linda Foster Benedict

fruit trees. Another class member, Bridget Plauchet, of Baton Rouge, wants to learn more about trees to help her husband with his tree-farming hobby.

Baton Rouge has one of the most dominant Master Gardener programs in the state, along with Lafayette, New Orleans, St. Tammany Parish and Shreveport. These programs sometimes have waiting lists of people wanting to get in. Classes have been capped at 35 to 40 people, although the average class size across the state is 15 to 20, according to Sara Shields, the regional horticulture agent in Pointe Coupee Parish, who took over as state coordinator for the program when Brashier retired.

Baton Rouge is also the oldest program in the state, getting its start in 1994, according to John D. Roy, a retired LSU AgCenter extension agent in East Baton Rouge Parish and now a volunteer with the program.

Roy said he had proposed the idea of adopting the Master Gardener program in Louisiana back in the late 1980s. The program had been spreading across the nation state by state since its founding in Washington state in 1972.

But Bob Souvestre, now retired, another extension agent in the parish, gets the credit for organizing the first official class, Roy said.

Now all 50 states have Master Gardener programs, and all are taught as part of the Cooperative Extension Service at land-grant universities, such as the LSU AgCenter. The mission to train volunteers is the same, although the particulars of each state program can vary, said Shields, a native Texan with a Ph.D. in horticulture from Auburn University in Alabama, who has worked for the AgCenter for nearly five years.

Louisiana is in the midst of major changes to the Master Gardener program, she said. The goals are to further expand the reach of the program and to stay ahead of environmental concerns associated with gardening and landscaping.

Though the program has always taught people to use as few chemicals as possible on their lawns and gardens, that's even more of a push now.

"The tendency has been for people to overtreat," Brashier said. "They may need to put 5 pounds of fertilizer on their yard. But the fertilizer comes in 10-pound bags, so they use all 10 pounds. But the grass only takes up 5 pounds, so the other 5 pounds runs off into the water system."

To help broaden the base of knowledge among volunteers about environmental issues, Louisiana has started the Advanced Master Gardener class, with the first group of 71 graduating in May 2016.

This new group receives intensive training on water quality, conservation and pest management. To get into the class, each enrollee must already be certified as a Master Gardener and pass the Louisiana Department of Agriculture and Forestry's pesticide applicator exam, which means they understand the proper and safe use of pesticides.

Many of the advanced lessons are online. And that's another change – to offer more opportunities online for people to become Master Gardeners, so they can take the classes any time of day or night and anywhere they have access to a computer.

"This will attract more working people and younger people. Right now the average age of a Louisiana Master Gardener is 65 to 70, although the youngest is 15," Shields said, adding that this young man went through the training when he was 13.

Another change is to allow people to go through the Master Gardener training but not have to do the volunteer service. They would receive a "home horticulture certificate," Shields said.

"There are many people who want the training, but they just can't commit to volunteer service," Shields said.

The cost for this option has not been set yet, Shields said.

The cost to become a Master Gardener is $150 to cover materials, although some groups around the state charge more and use that money to cover other expenses associated with the class, such as lab materials and refreshments.

Shields said the handbook and policy manual used for the classes are being revised and will be available in 2017.

People interested in the Master Gardener program can contact their local LSU AgCenter parish extension office or send an email to Shields at LMGCoordinator@agcenter.lsu.edu. They can also find more information at www.LSUAgCenter.com.

Linda Foster Benedict is a professor and the associate director of LSU AgCenter Communications. She is also editor of Louisiana Agriculture magazine.

Members of the Master Gardener class in East Baton Rouge Parish include seated, left to right: Nicole Chapman, Debi O'Neill, Sharon Davis, Dr. Rus Westfall, Andre Brock, an extension agent in West Feliciana Parish, and Cathy Richard; and standing left to right: Linda Medine, Darrell Patterson, Ken Bosso, Helen Campbell, Carol Adams, Sharon Davis, Nicholas Acosta, Miles Brashier, an extension agent who is teaching the class, and Randy LaBauve, a videographer with LSU AgCenter Communications.

Target Spot of Cotton
A Lion or a Lamb?

Trey Price, Myra Purvis, Hunter Pruitt,
Jerry Bartleson, Dan Fromme and Boyd Padgett

Over the years in Louisiana, target spot, a foliar disease caused by the fungus *Corynespora cassiicola* has merely been noted by producers, consultants and specialists in cotton-producing parishes and has not been a major issue. Since 2011, the disease has been a significant, sporadic issue in Arkansas and Mississippi, and in 2014, a moderate to severe epidemic occurred in central and northeast Louisiana with the most affected areas in Franklin, Madison, Rapides, Richland and Tensas parishes (Figure 1). These severe epidemics left many stakeholders with questions concerning management of the disease: Where did it come from? Why was it so severe? Was there something that could have been done to prevent it? How much yield was lost? What if this happens again? What do people need to look for?

The following information should shed some light on target spot management so that producers will be better prepared for a future outbreak and answer the question is target spot a lion or a lamb?

Generally, symptoms of target spot will not appear in cotton until around flowering or canopy closure. The pathogen causes brown to tan, pencil eraser to dime-sized (or larger) lesions (Figure 2), beginning on the lowest leaves. As the disease continues to develop, defoliation begins in the lower canopy and progresses upward (Figure 3). This is important because the disease can easily go unnoticed if cotton is not being scouted properly and often. Mature lesions will exhibit a bull's-eye-like appearance because of the concentric growth of the fungus (Figure 4). It is unknown if the defoliation is caused by a toxin produced by the fungus, a defensive reaction by the plant or a combination of both. The disease will rarely completely defoliate cotton plants. In 2014, however, defoliation of up to 75 percent was observed in producer fields (Figure 5). The fields looked completely normal from the field edge, but upon closer inspection, the upper canopy was merely a shell.

Rainfall, wind and overhead irrigation fuel epidemics, and the pathogen can overwinter in cotton and soybean plant debris. Soybean is an alternative host for the pathogen. No cotton varieties are completely resistant to target spot; however, disease severity may vary among varieties, presumably because of differing plant structure. Any cotton variety that is subject to rank growth is susceptible to target spot. In Alabama and Georgia, where target spot has been an annual problem since 2005, yield losses have been estimated from 60 to 280 pounds of lint per acre in severe cases. In these areas, the disease usually occurs midseason (the first few weeks of bloom), and weather conditions consistently favor disease development. Fungicide applications have been shown to slow disease development and preserve yield in the southeastern United States.

During 2014 and 2015, LSU AgCenter scientists researched fungicide efficacy on target spot in Louisiana. Over the two-year project, 13 foliar fungicide trials were conducted at three locations – the Dean Lee Research and Extension Center in Alexandria, the Macon Ridge Research Station in Winnsboro and the Northeast Research Station in St. Joseph – in an effort to provide cotton producers with key management strategies for the disease. The experimental designs of the trials were relatively simple, using fungicides with different modes of action and

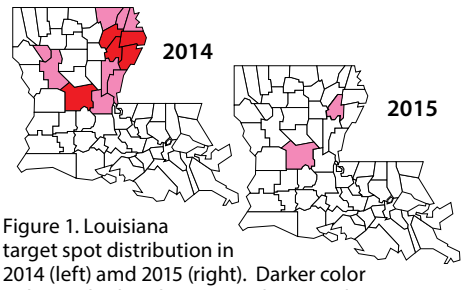

Figure 1. Louisiana target spot distribution in 2014 (left) amd 2015 (right). Darker color indicates higher disease incidence and severity.


Figure 2. Initial symptoms of target spot.


Figure 3. Defoliation begins in the lower canopy and progresses upward.


Figure 4. Mature target spot lesions.


Figure 5. Severe defoliation due to target spot.

two different timings. Fungicides used in the studies included Headline, Priaxor, Quadris, Quilt and Topguard applied during the first and/or third weeks of bloom. Three varieties were evaluated, and disease development in the trials varied by location and variety. Disease severity, as measured by defoliation, ranged from zero to 60 percent. Disease incidence, determined by estimating the percentage of foliage with at least one lesion, ranged from 5 to 85 percent. Because of low disease pressure, some trials were not successful. In an effort to avoid redundancy and to be concise, results from two representative trials are presented here.

At Dean Lee during 2014, Headline (6 fluid ounces per acre) or Priaxor (4 fluid ounces per acre) was applied during the third week of blooming and significantly slowed target spot development compared to the nontreated controls (Figure 6). Disease incidence ranged from 35 to 85 percent while disease severity ranged from 19 to 60 percent on the final rating date, August 26. There were no statistically significant differences in yield; however, there were trends of preserved yield in plots treated with Headline or Priaxor during the third week of blooming.

At the Macon Ridge Station during 2014, in a trial with a slightly different design, Headline (6 fluid ounces per acre) or Priaxor (4 fluid ounces per acre) applied twice (first and third week of blooming) resulted in significantly less target spot incidence and severity (Figure 7). Headline applied during the first week of bloom followed by Priaxor during the third week, or vice versa, also resulted in significantly less target spot incidence and severity. Disease incidence ranged from 34 to 80 percent while disease severity ranged from 17 to 53 percent on the final rating date, Sept. 18. As with the other trial, there were indications of yield preservation at this level of disease pressure.

Weather conditions were ideal for target spot development at all three locations with much cooler and rainier conditions than normal for Louisiana during the cotton blooming period in 2014. In 2015, weather conditions during the growing season were hotter and drier than in the previous year. For instance, at Chase, Louisiana, near Macon Ridge, average temperatures from July 1 to Aug. 15 were 79.4 degrees in 2014 and 84.8 degrees in 2015 while average rainfall was 10 inches in 2014 and 2.5 inches in 2015. As a result, target spot only developed to trace amounts in the state, indicating the disease is strongly driven by environmental conditions.

Based on this research, the AgCenter has developed these management strategies for target spot:

Scouting is key. Because the disease starts low in the canopy, efforts must be made to identify the presence of target spot early. This can be done while scouting for tarnished plant bugs and other insect pests.

Watch the weather. If cool and rainy conditions prevail, target spot epidemics are likely. If weather is hot and dry, damage from this disease is unlikely.

Watch neighboring soybeans. If target spot epidemics are occurring in soybeans, conditions are also favorable for development in cotton.

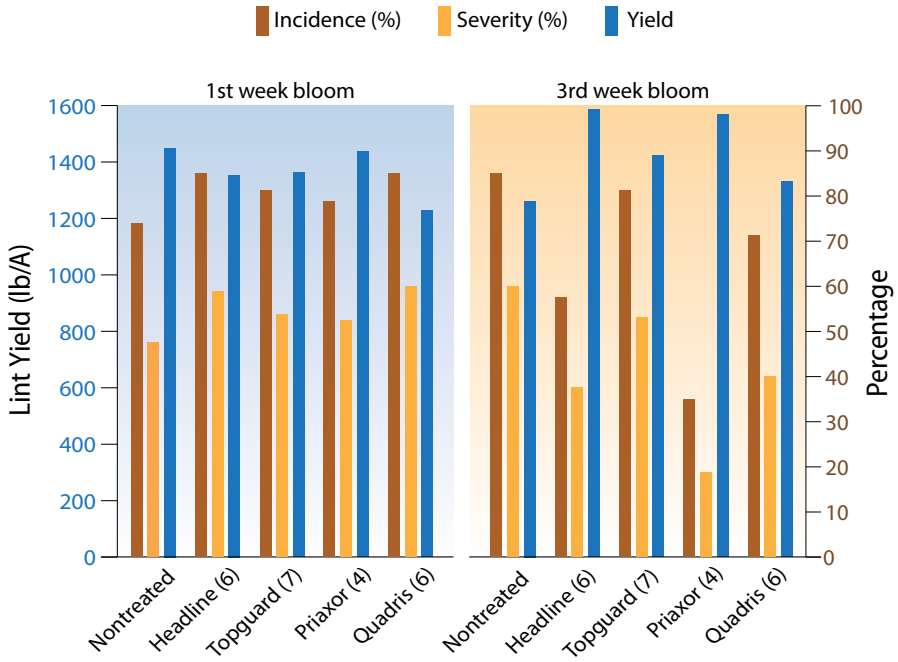

Figure 6. Effect of fungicide and application timing on target spot incidence and severity, 2014, Alexandria, LA.

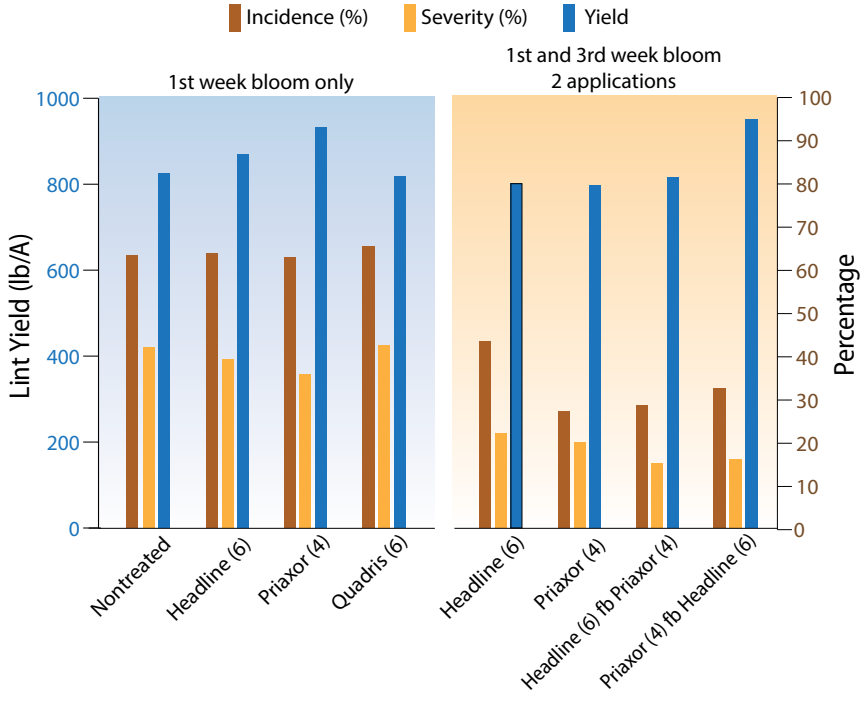

Figure 7. Effect of fungicide and application timing on target spot incidence and severity, 2014, Winnsboro, LA.

Canopy management. Timely applications of plant growth regulators to cotton can reduce plant height and girth, possibly reducing the risk of developing target spot.

Timely application of fungicides. Fungicide applications during the first several weeks of blooming have been shown to slow disease development and preserve yield in other states. Results from AgCenter research indicate slowed disease development and trends toward yield preservation; however, more research is needed to confirm this in Louisiana. If applications are deemed necessary, ground applications with high water volume will ensure maximum coverage.

Don't panic. Just because target spot has been identified in a cotton field does not mean a fungicide application is necessary. Make application decisions field by field, taking into account the stage of the crop, prevailing weather conditions, the likelihood of a return on the investment and previous experience.

Don't seek revenge. If a target spot epidemic catches you off guard and significant defoliation has occurred, a "rescue" application will not likely deliver enough material or preserve enough foliage to make a difference.

Given observations over the past few years, target spot can be either a lion or a lamb, and, unfortunately, outbreaks are just as easy to predict as the weather.

Author's Note: During the 2016 growing season, target spot was widespread, and moderate to severe outbreaks occurred. Frequent rainfall events during July and August fueled epidemics. Unfortunately, data from the current growing season were not available at publication time.

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Paul P. "Trey" Price III is an assistant professor and Myra Purvis, Hunter Pruitt and Jerry Bartleson are research associates at the Macon Ridge Research Station in Winnsboro. Dan Fromme is the Tom & Martha Burch/Delta & Pine Land Professor in Cotton Production/Genetics, and Boyd Padgett is director of the LSU AgCenter Central Region.

Search for a Narrow-range, Minimum-risk Insecticide for Sugarcane Borer Control

T. Eugene "Gene" Reagan and Kenneth Gravois

In 2014, more than 80 percent of all the tebufenozide (Confirm) insect growth regulator insecticide produced in the U.S. was applied to Louisiana sugarcane for control of the sugarcane borer. Use of this insecticide, which is considered narrow-range and minimum-risk, came about through an intensive evaluation by LSU AgCenter researchers. During the last half of the previous century, stalk borer control and use of insecticides in U.S. sugarcane led to many environmental concerns with fish and bird kills, numerous effects on nontarget and beneficial arthropods, as well as pesticide resistance. The review and termination of many effective insecticides for the sugarcane industry led researchers at the LSU AgCenter to search the world over for what turned out to be a new class of narrow-range, minimum-risk insecticides called the MACs or molting accelerator compounds. These insecticides affect larval growth of some Lepidopterous insects, particularly some in the Pyralid and Crambid groups. Tebufenozide (RH-5992) was later labeled by Rohm and Haas Company under the trade name Confirm and received the Environmental Protection Agency Green Chemistry Challenge Award in 1998.

Since the first evaluation of tebufenozide for sugarcane borer control in 1993, it became obvious to the AgCenter research team that the chemical was different from most other insecticides in how it worked. Most insecticides work by rapidly killing insects within a few hours after exposure. However, tebufenozide was shown to act only during the molt, which is when insects shed their exterior covering during growth. Larvae exposed soon after the molt showed no chemical effects for several days until after the next molt. In addition, from the many insecticide studies in 1994 and 1995 (many chemicals often causing significant two- or three-fold reductions of nontarget and beneficial insects), the only insecticide studies not suppressing nontarget crickets, beneficial spiders, and other selected arthropods was tebufenozide. Additionally, in classical biological control studies with borer parasitoids exposed to sugarcane leaves taken immediately from insecticide-treated, replicated field plots, tebufenozide was the only chemical that did not kill parasitoids.

The goal was to find an insecticide that would kill only the sugarcane borer without harming nontarget or beneficial organisms. For that reason,

first evaluation of tebufenozide for sugarcane borer control

1993

researchers pushed for the tebufenozide label in contrast to methoxyfenozide (RH 2485) Intrepid insecticide, which was toxic to many other insects as well as the sugarcane borer, and now has a few more labels. In addition, researchers expected the field toxicity rate would have to be higher for Intrepid with the sugarcane borer. Tebufenozide also is labeled and used for control of the codling moth and leaf miner in pome and stone fruits, but these and other uses are in great distances from sugarcane insect control.

Interactions of host plant resistance and insecticide use differ substantially depending on whether tebufenozide

2014

more than 80 percent of all the tebufenozide (Confirm) insect growth regulator insecticide produced in the U.S. was applied to Louisiana sugarcane for control of the sugarcane borer

is used for sugarcane borer control or Mexican rice borer control in sugarcane. With the sugarcane borer, resistance of cultivars is based on early rind hardness (at the time early stage larvae enter the stalk) as well as leaf sheath appression (how tight the leaf sheath is to the stalk) together with several other factors. However, plant features involving Mexican rice borer-resistant sugarcane cultivars relate very much to the period of time the insect pest is exposed to tebufenozide or other insecticides on the surface of the stalk. Cultivars that allow the Mexican rice borer to enter the sugarcane plant more rapidly than other cultivars are more susceptible because they protect larvae from insecticide exposure (inside the stalk) as well as from some arthropod predators and parasitoids unable to maneuver past Mexican rice borer excrement that is packed in the tunnels. Tunnels of the sugarcane borer are far more open, allowing entrance of arthropod predators and parasitoids.

Insecticide use in the Louisiana sugarcane industry averaged approximately three annual applications before tebufenozide was introduced in 1993 to substantially less than one half of an application today. Much of that reduction is due not only to efficacy of tebufenozide, but also to a major enhancement of biological control involving tebufenozide conservation of beneficial arthropods throughout the sugarcane industry.

Low levels of insecticide resistance with tebufenozide have been detected in Louisiana. However, substantially less insecticide use for control of the sugarcane borer has led to reduced tebufenozide selection pressure. Additionally, because of pesticide resistance concerns, alternating tebufenozide with insecticides with other modes of action is recommended. Tebufenozide is at the center of integrated pest management control of the sugarcane borer in sugarcane in Louisiana. Without the availability of tebufenozide for Louisiana sugarcane growers, insecticide use will increase and sugarcane yields will decrease. Tebufenozide remains by far the most important insecticide for sugarcane borer control in Louisiana sugarcane.

Sugarcane borer larvae. Photo by Johnny Saichuk

The goal was to find an insecticide that would kill only the sugarcane borer without harming nontarget or beneficial organisms.

History of Insecticide Use in Sugarcane for Sugarcane Borer Control

In the late 1950s, the organochlorine endrin was used. It killed everything in the field – borers, ants, spiders, snakes, birds and fish (with runoff). Because of fire ant suppression, borer problems increased and insecticide resistance became a problem.

Guthion and Azodrin (organophosphates) replaced endrin but caused problems with fish and bird kills. In 1992, the Environmental Protection Agency had a meeting in the LSU AgCenter over the 1990 and 1991 fish kills resulting immediately in severe restrictions (prescription use) on Guthion use in sugarcane, and finally, loss of the label three years later. Carbamates including Sevin were also labeled and used. Pydrin and other pyrethroids were then used, substantially impacting numerous nontarget arthropods and some beneficials. The only insecticides labeled for foliar spray in rice today are pyrethroids, and Louisiana rice producers still have no economic thresholds for stem borers.

When these other insecticides for the Louisiana sugarcane industry were restricted or taken away by EPA, LSU AgCenter scientists began collaborating with the Rohm and Hass Company research laboratory in 1992 at Philadelphia. It is interesting that with one of their first studies with tebufenozide, Rohm and Hass scientists had put the larvae on a back bench to discard, but they forgot to throw them out when it did not work. Then when the scientists returned several days later to discard the larvae, all of the anticipated LD-90 larvae were dead because they had molted again. That began the start of the environmental award for tebufenozide.

T. Eugene "Gene" Reagan is the Austin C. Thompson Distinguished Professor of Entomology, Ecology and Pest Management and extension IPM coordinator. Kenneth Gravois is the Graugnard Brothers Professor and sugarcane extension specialist.

Use of Bermudagrass Hay by Stocker Calves Grazing Annual Ryegrass Pastures

Guillermo Scaglia

Retaining calves in a stocker program seems to be a viable opportunity to add value to them. Most producers in the Southeast wean calves in the fall following spring calving and have the potential to increase calves' body weight by using annual winter forages. Even more, producers on small farms (fewer than 60 acres) may benefit from strategic use of small areas of high nutritive value pastures, which may allow them to retain calves for marketing a few months later.

From a nutritional standpoint, annual ryegrass can provide up to 28 percent crude protein (depending on level of fertilization), which is approximately twice what a fall-weaned calf requires, with observed daily gains of 2 to 3 pounds; however, 60 percent of the nitrogen consumed by these calves is excreted in urine. This lack of efficiency might be corrected by limiting access to ryegrass while keeping cattle on low quality hay when off the pastures.

Before high-quality winter pastures become available, weaned calves are on a transition diet, which is usually made up of dry hay from bermudagrass or other summer grasses sometimes supplemented, as it must be done for this class of cattle, with a byproduct such as rice bran, corn gluten feed, soybean hull pellets or some other supplement that might be available close to the farm. This transition diet is lower in quality and less digestible than high-quality pasture, so when calves are transferred from the former to the latter, for approximately 15 to 20 days the animal and its rumen microbes (the "bugs" ultimately responsible for the degradation of the feed an animal consumes) need to adapt to this new diet. During this time, calves seem to lose weight and their excreta becomes "watery." Once this adaptation period ends and with appropriate grazing management, however, calves will perform well on these pastures.

Hay can make this transition period easier on calves. In the first 15 to 20 days of the grazing period, calves will consume some of the hay if it is available as a way to "self-medicate" themselves because of the change in diet. The calves' "nutritional wisdom" makes sense because the hay will tend to retain forage particles in the rumen, thus increasing the probability of them being digested. Many producers provide hay in ryegrass pastures because of anecdotal information including "calves perform better," "calves look healthier," "hay helps extend the grazing season," "hay is needed when calves run out of grass" and "we have been doing it for decades."

The performance and grazing behavior of calves were compared on four treatments: 1) continuously stocked on annual ryegrass with no hay; 2) continuously stocked on annual ryegrass with hay; 3) stocked with access to ryegrass on alternate days with as much hay as they could eat when not on pasture; and 4) grazing on ryegrass for four consecutive days (96 hours) followed by three consecutive days (72 hours) only with access to all the hay they would eat.

Because the last two groups were on pasture only half of the time as those permanently on pasture, the area of ryegrass for the last two groups was half the size dedicated to the first two. This experiment was conducted for three consecutive years at the LSU AgCenter Iberia Research Station.

Table 1 shows animal performance in the different treatments. Steers grazing annual ryegrass with or without hay had a similar average daily gain and gained significantly more than steers that alternated grazing with hay (24 hours of grazing followed by 24 hours of hay). Those on annual ryegrass for 96 hours followed by 72 hours on hay gained significantly less than the other groups.

Observations

Hay consumption was estimated for those steers on pasture while steers not on pasture for one or three days were fed hay individually using electronic gates. Magnetic keys hanging from collars of these steers (Photo 1) opened small electronic gates, which could only be opened by one specific key, so the amount of hay each steer consumed was measured.

Steers that alternated grazing and hay every 24 hours ate more hay (5.1 pounds per head per day or approximately 1 percent of their body weight) than those that were in the barn for 72 consecutive hours (4.1 pounds per head per day; 0.8 percent of their body weight).

This hay consumption was low, which was noticeable for steers in the 96-hours-on-ryegrass/72-hours-on-hay group and explains their low overall average daily gain (Table 1). This may just have been a response to the quality of the hay. The level of crude protein approached the minimum requirement for rumen microbes to "work" efficiently, and fiber content was very high.

These factors may have contributed to what is called "rumen compaction," which means the hay can't be digested because the rumen "bugs" are not work-

Table 1. Average daily gains and productivity per acre for all 4 treatments (means of 3 years)

	Only ryegrass	Ryegrass + hay	1 day ryegrass; 1 day hay	4 days ryegrass; 3 days hay
Average daily gains, pounds	2.66	2.59	1.55	1.22
Production, pounds per acre	456	444	400	314

Table 2. Average daily gains (pounds) of steers grazing ryegrass only or grazing ryegrass plus hay (means of 3 years). Day 1 is the first day of the grazing season, day 7, 14, 15, and 30 of grazing season thereafter

Days on ryegrass	Only ryegrass	Ryegrass + hay
1 to 7	1.20	1.12
1 to 14	2.07	2.21
15 to 30	2.89	2.77

ing properly and the rumen does not get emptied. This causes the animal to feel full and not eat enough hay or ryegrass. Better quality hay might be an appropriate choice.

Gains for the two groups that were continuously on ryegrass (with and without hay) were similar (Table 1). So adding hay did not improve performance. Table 2 shows that from day one to day seven, when animals are getting adjusted to high-quality annual ryegrass, average daily gains were small because the steers were eliminating hay from their rumen and replacing it with their new diet, ryegrass.

After an additional week, their average daily gains are already more than two pounds and their adaptation is nearly complete. At this time we may still see "watery" feces, but this gradually will disappear.

From day 15 to 30, the animals are fully adapted, with the gains, in some cases above 3 pounds per day, explained by the so-called "compensatory gain." Usually when cattle perform below their potential for a period of time because of low nutrition (for example, a hay-feeding period before grazing annual ryegrass), they will have greater gains immediately after their nutritional status is improved when placed on high-quality pastures. Compensatory gain is maximized when the time of low nutrition is not excessively long and gains during this period are not lower than half a pound a day.

Figure 1 shows the frequency at which steers were eating hay while they were grazing ryegrass. The data were obtained by observing all steers – three groups of six steers each – once every 30 minutes from 7 a.m. to 6 p.m. for 23 observations per day. A good number of the steers ate hay during the first few days because that had been their main diet for a few months and they had a "familiarity" with it. They also may recognize they need hay to help their digestion or supplement their new diet.

By day seven, the frequency of visits to the hay ring diminished and remained low throughout the grazing season. The groups of steers grazing ryegrass with hay available never completely consumed the hay bale that was offered at the beginning of the grazing period. By the end of the experiment, bales look like the one in Photo 2; hence, the amount of hay that steers consumed during the grazing period was relatively small.

With appropriate grazing management – grazing system, stocking rate, forage allowance – and animal health care, there is no need to provide hay to stocker cattle grazing high-quality pastures. For a short period of time at the beginning they may look like they are losing weight, but this is an effect of changing the diet and reducing their gut fill. The cattle will gain well after this short period, and their overall performance will not be affected. Alternating grazing and hay feeding (24 hours by 24 hours) might be an alternative for small producers, but it certainly requires a close look to avoid affecting animal performance. Longer periods of feeding low-quality hay are not recommended; however, if hay or baleage from ryegrass or other annual grasses with or without legumes is available, it should be a good complement for this practice.

Photo 1. Steers on ryegrass for 24 hours and fed hay for 24 hours. Note the collar with the key to open feeding gates. Photo by Guillermo Scaglia

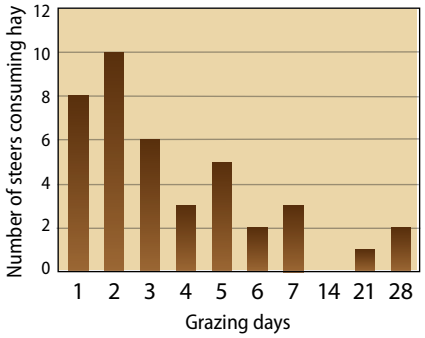

Figure 1. Frequency at which steers were eating hay (from day 1 to day 28 of the grazing season) while they were grazing ryegrass.

Guillermo Scaglia is a professor at the Iberia Research Station and beef cattle initiative coordinator for the Southwest Region.

grazing management . . . there is no need to provide hay to stocker cattle grazing high-quality pastures

Photo 2. Steers continuously stocked on ryegrass with hay. Note that the bale was not entirely consumed two weeks before the end of the experiment. Photo by Guillermo Scaglia

Photo 3. Steers grazing ryegrass with no hay. Photo was taken approximately four weeks before the end of the experiment. Photo by Guillermo Scaglia

Grazing Brassicas

During Fall Transition in South Louisiana

Guillermo Scaglia

Louisiana has the opportunity to grow abundant forage. Warm-season perennial grasses – primarily bermudagrass and bahiagrass, sometimes associated with dallisgrass – are the core of the forage systems. Annual summer legumes and grasses (cowpeas, sorghum-sudan hybrids and pearl millet) can complement these resources. In winter, cool-season annual grasses (oats, cereal rye and annual ryegrass) or legumes (ball, crimson, berseem and white clovers, among others) can be planted successfully. Even though many species can fit into the different ecoregions of the Southeastern U.S., warm-season perennial grasses have traditionally been the forage base for beef cattle systems.

These warm-season perennial grasses, however, do not provide an adequate, year-round supply of feed or adequate nutrition for growing cattle. A few alternatives can extend the grazing season and reduce the hay-feeding periods, also called transition periods or gap periods. These periods, May and June and October through December, are usually accompanied by stockpiled or conserved forages, which, depending on the nutrient requirements of the animal, may or may not need to be supplemented. Because of the increased use of cover crops in the Northeast, Midwest and upper Midwest, producers in the Southeast have become familiar with forage alternatives that can be used for grazing. Forage brassica crops such as turnip, swede, rape and kale can be used to extend the grazing season in November and December.

Forage brassicas are annual crops with great nutritive value and can be grazed 80 to 150 days after seeding, depending on the species and region of the country. The leafy top is grazed, and the roots, if an animal can get to them, contain protein and carbohydrates. Despite these advantages, these forages require appropriate management not only for their own productivity but also for the grazing animals. Research efforts are underway to better understand their management and their impact on soil health, as well as their use and response under grazing conditions.

Pastures and Grazing Management

In two consecutive years, brassicas in combination with grasses and legumes were planted in early October at the LSU AgCenter Iberia Research Station in Jeanerette. The objective was to evaluate their performance and their possible inclusion to cover the fall transition period in year-round forage systems. A mix of annual ryegrass, cereal rye, radish, oats, purple top turnip, kale, white clover and red clover was sown into a bermudagrass-free sod and into a bermudagrass sod from which hay had been harvested a couple of weeks earlier, so the pasture was short and lightly disked before planting.

After 20-26 days of planting, the stand in both years was mostly brassicas

Table 1. Nutritive Value of Brassicas

	Dry matter, %	Crude protein, %	Neutral detergent fiber, %	Acid detergent fiber, %	Total digestible nutrients, %
Foliage					
Radish	9.8	19.6	23.9	21.9	71
Turnip	11.1	26.5	28.6	26.9	73
Kale	10.9	20.1	30.1	29.7	69
Bulbs					
Turnip	No data	16.5	15.8	23.8	67

Foliage and bulbs (only from turnips) were collected, separated and analyzed in a commercial laboratory. Data are the means of samples taken at three sampling times during the grazing period in two consecutive years.

Photo 1. Brassicas on bermudagrass-free sod, late October 2014. Photo by Guillermo Scaglia

Photo 2. Brassicas on a bermudagrass sod, late October 2014. After harvesting hay, the sod was lightly disked an average of 10 days before planting each of two years. Photo by Guillermo Scaglia

Photo 3. Forage height was approximately 11 inches at the start of grazing in the pasture planted on bermudagrass-free sod. Photo by Guillermo Scaglia

Photo 4. Cows were rotationally stocked and moved daily to small areas for grazing. This allows for even grazing, avoiding trampling and improving manure distribution. Photo by Guillermo Scaglia

(Photos 1 and 2). Forty days after planting, pastures were fertilized with nitrogen. Starting in early December, mature, nonpregnant cows averaging 1,300 pounds were rotated daily (Photos 3, 4 and 5) to provide enough pasture for one day. On average, cows grazed these pastures until early April, with ryegrass and clovers making the greatest contribution of forage; however, brassicas represented an insignificant portion of the pasture after 60 days of grazing them. During these 60 days, cows gained 45 pounds and maintained a body condition score of 7 on a scale of 1=emaciated to 9=obese. As to be expected, the nutritive value of

Forage brassica crops such as turnip, swede, rape and kale can be used to extend the grazing season in November and December.

these forages was very good. Values are similar to what can be expected from annual ryegrass and some of the clovers that are used for grazing in Louisiana. Dry matter content, though, is very low, nearly 90 percent of the fresh weight is water. Because of this, young cattle consuming only brassicas must also have hay available. The hay will help digestion and give gut fill, which is needed for correct ruminal function. If no hay is available, this problem can be avoided by combining the brassicas with grasses and clovers. Instead of hay, these grasses and legumes will provide the necessary, effective fiber. Adult cattle are less prone to have this problem, although care should be taken for a few days after cattle transition from a different diet into a brassica-based one.

Final Comments

Before using brassicas for grazing, a producer should know they may cause health disorders in grazing animals if not managed properly, although most are easy to control. The main disorders are bloat, atypical pneumonia, nitrate poisoning, hemolytic anemia (mainly with kale), hypothyroidism, polioencephalomalacia and choking by ingesting bulbs. None of these disorders occurred during this research. Once cattle discover the turnip bulbs, they will pick up the bulbs and try to chew them to reduce their size. Some of these bulbs may be large enough to become a choking hazard, especially with young cattle.

Several issues require further research. Based on the objective of producing green forage for the transition period, for example, it may have been more productive to start grazing in early October. So, can brassicas be planted in August or earlier? Can they be mixed with some other summer or winter annual grass or legumes to improve forage production in October to December? Other issues include differences in nutritive value among varieties, response to drought or excessive rainfall, fertilization requirements, best combination with forage species and when to initiate grazing. Continuing research should resolve some of these issues.

Guillermo Scaglia is a professor at the Iberia Research Station and beef cattle initiative coordinator for the Southwest Region.

Photo 5. The difference between pasture areas the day following grazing (left) and the grazing will begin (right).

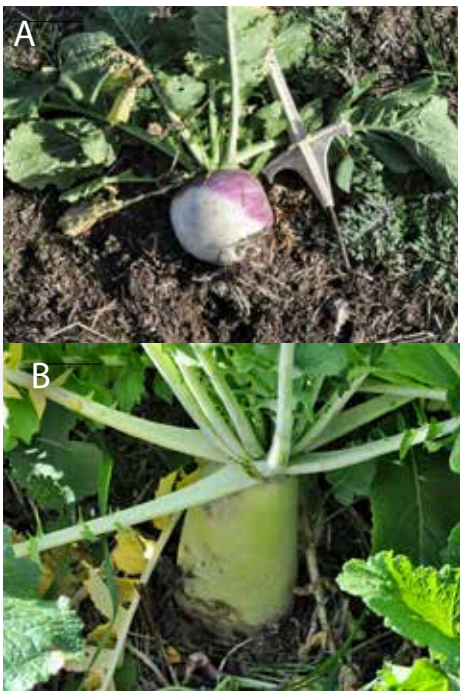

Photo 6. Turnips (A) are the bulbs of preference, probably because they are easier to pick up than radishes (B). Photos by Guillermo Scaglia

Impact of Salinity Stress Using Recycled Potting Media in

Greenhouse Tomato Production

Changyoon Jeong, Carrie Lott, Nolan Glenn and Patrick Colyer

When producers grow tomatoes in greenhouses, they tend to use excess fertilizer and water to maximize yields. This excess leads to the rapid accumulation of nitrate, phosphate and salinity in the growing media. In greenhouse systems, salinity accumulation in the growing media interrupts tomato seed germination, hinders plant growth and decreases yield. The critical mechanism of salinity impact on tomato production is mainly ionic osmotic stress created by the nutrient imbalance in the vascular system in the plant from a high concentration of sodium and chlorine ions in the soil. Accordingly, high salinity causes osmotic unbalance and then decreases plant water uptake leading to transpiration inhibition.

Tomato breeding programs to improve the salinity tolerance have been limited because of the genetic and physiological complexity of the tomato plant. Also, the selection of growing media for tomato production in the greenhouse is an important parameter for supplying water, air and nutrients in the pore spaces in the medium. Several factors affect air and water status in growing media, such as the media components and ratios, the height of the media in the container, and watering practices. The capacity of the media to hold and make available nutrients is affected by the cation exchange capacity (CEC) and the media pH. The CEC is defined as the holding capacity of exchangeable cations, which usually include most nutrients. Since most components of the media are acidic, which means a pH less than 7, the initial pH adjustment is critical for tomato production. The pH range should be between 5.8-6.2.

Traditional growing media for tomato production are peat, perlite, rock wool, shredded pine bark and vermiculite. The preliminary research from the Red River Research Station showed that perlite was

Using recycled perlite saves money in production costs for greenhouse tomatoes, but yields are reduced. Further research is required on the threshold for recycling potting media without impacting tomato yield. These are plants at a greenhouse at the LSU AgCenter Red River Research Station in Bossier City, where Changyoon Jeong, assistant professor, conducts research. Photo by Changyoon Jeong

easily recyclable as a growing media. Recycling media for tomato production will reduce initial costs for producers. However, tomato growers need more information on accumulation of salts in recycled media and their impact on tomato yield. The objective of the study was to evaluate the impact of salinity on tomato yields comparing recycled and new growing media.

Four varieties – Caiman, Torero, Taymyr and Geronimo – were transplanted to the growing bags with recycled and new perlite in the greenhouse after five weeks of growth. Two transplants were planted at a 3-inch depth and spaced 7 inches apart in each growth bag. Fruit clusters were managed to three or four fruit per cluster unless clipped to remove excess fruit from each pot. Tomato plants were fertilized with irrigation water three times weekly for 10 weeks, from October 5 to December 7, 2015.

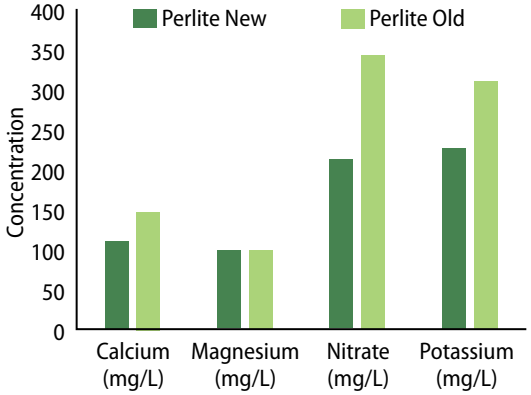

Figure 1. The potting media analysis of calcium, magnesium, nitrate and potassium concentration after tomato harvest.

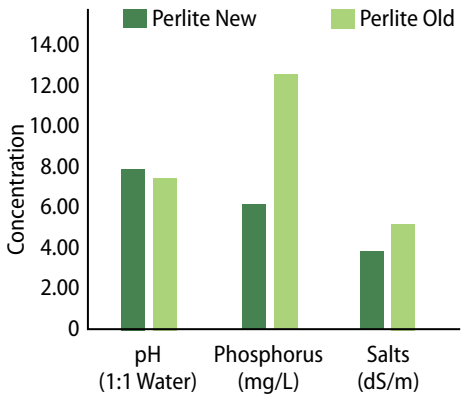

Figure 2. The potting media analysis of pH, phosphorus and soluble salts concentration after tomato harvest.

The results of potting media analysis after harvest indicate that calcium, magnesium, nitrate and potassium were 1.3, 0.98, 1.6 and 1.4 times higher, respectively, from the recycled potting media than from the new potting media (Figure 1). Additionally, total phosphorus and soluble salt from the recycled potting media were 2.0 and 1.3 times higher, respectively, compared with results from the new potting media (Figure 2). The pH was decreased 0.43 in recycled growing media due to the replacement of salts in binding sites of growing media.

. . . the selection of growing media for tomato production in the greenhouse is an important parameter for supplying water, air and nutrients . . .

The total yield of tomatoes from a new perlite potting mix ranged between 9.32 and 10.79 pounds per plant, and the yields from an old recycled potting media varied between 9.05 and 10.49 pounds per plant (Table 1). Among the varieties, Caiman was the most sensitive to the salinity stress on total yield. Torero appeared to be the most salt-tolerant. These findings may help producers select the salt-tolerant varieties in tomato production with recycled growing media.

The material cost of tomato production is in Table 2. This study showed some yield reduction when 20-times recycled perlite was used in tomato production. The total savings from using recycled perlite was $13,150 per greenhouse. Further research is required on the threshold for recycling potting media without affecting tomato yield.

Table 1. Influence of salts accumulation in growing media on tomato yields and reduction rate. The growing media was compared between new and recycled perlite for tomato production.

Variety and growing media	Yield (lb/plant) (n=30)	Reduction Rate (%)
Caiman new	10.44	
Caiman recycled	9.62	-7.87
Torero new	9.45	
Torero recycled	9.22	-2.42
Taymry new	9.32	
Taymyr recycled	9.05	-2.97
Geronimo new	10.79	
Geronimo recycled	10.49	-2.74

Table 2. Cost of perlite as a growing medium, grow bag and transplant container in 600 tomato plants in a 30-by-96-foot greenhouse at the Red River Research Station. The cost was calculated based on 2016 retail prices.

	Cost
Perlite	$657.50
Grow bags	$ 75.00
Transplant containers	$ 25.00
Total	**$757.50**

Changyoon Jeong, assistant professor; Carrie Lott, research farm supervisor; Nolan Glenn, research associate; and Patrick Colyer, Northwest Region director, are all at the Red River Research Station, Bossier City.

Complexities of Antimicrobial Use in Livestock and Poultry Production

Christine B. Navarre

Antimicrobial resistance is considered by many to be the most complex problem facing public health today. Human health, animal health and the environment are all interrelated, and much is still unknown about the role each plays in antimicrobial resistance. This, unfortunately, leads to speculation, misinterpretation and misuse of the available information. What has followed is intense scrutiny of the use of antimicrobials in livestock and poultry production in the past decade. Antimicrobials are used to combat bacteria, fungi, viruses and parasites.

A concern is that if a food animal harbors an antimicrobial-resistant organism, the potential exists for that resistance to spread to people through the food supply. While this is plausible, the evidence to support human foodborne illness from a resistant organism arising from antimicrobial use in food animals is sketchy. Even if resistance from use in food animals should make it to food products, properly cooking food should prevent illness and spreading resistance.

Other commonly cited concerns are the amount of antimicrobials used in food animals as well as the indication for use. Anti-animal agriculture activists commonly report that 80 percent of antimicrobials in the U.S. are used in food animals. This number is misleading for several reasons, but the main one is that this figure includes a class of antimicrobials that even opponents agree has no impact on human health. Also, pounds of food animals outnumber pounds of people approximately 2 to 1, so it is expected that use in animals would be higher than in people.

The indications for use of antimicrobials in food animals are also often misunderstood. The terms "non-therapeutic" and "sub-therapeutic" are often used, but they have not official definition. The U.S. Food and Drug Administration approves four general uses: to increase rate of gain or feed efficiency; for prevention; for control, and for therapy/treatment.

It is common for opponents to implicate the use of low doses of antimicrobials delivered in feed to large groups of food animals for growth promotion and prevention as contributing to widespread antimicrobial resistance. The fact that bacteria don't behave according to label classifications, and sweeping generalizations such as this are not based on science. Each bacteria-animal-antimicrobial-dose-delivery combination is unique, and extrapolations should not be made from one combination to another.

Central to this debate is the application of the Precautionary Principle – which means when an activity raises threats of harm to human health or the environment, precautionary measures should be taken, even if some cause-and-effect relationships are not fully established scientifically. In this context, the use of the Precautionary Principle would dictate that antimicrobial use in food animals should be banned just because a threat is possible, even though risk assessments show that this use poses a miniscule risk to human health. Unfortunately, applying the Precautionary Principle has potential downsides. Using these products makes animal food production more efficient, making food more available and more affordable with less impact on the environment. Some risk assessments show a possible increase in food-borne illness. Also, there are animal welfare implications to withholding medications from animals in need.

While there is much still to learn about antimicrobial resistance, most public health professionals will agree on some general principles:

- Antimicrobial resistance is a worldwide problem for both humans and animals. Animals can transfer resistant bacteria to people, and people can transfer resistant bacteria to animals.
- Any antimicrobial use in animals, people or the environment can potentially lead to resistance. Antimicrobial resistance can also arise without the use of antimicrobials.
- While antimicrobial resistance is biologically inevitable, it is everyone's responsibility to try to slow down the progression to preserve uses for as long as possible.
- Prudent use of antimicrobials in people, animals and the environment is essential. What is in debate is what constitutes prudent use.

To address the rising concern of antimicrobial resistance, the Food and Drug Administration in 2003 issued Guidance for Industry (GFI) #152, which describes a risk-based assessment process to evaluate the potential for antimicrobial resistance to be used in the approval process for new antimicrobial drugs in food-producing animals.

In 2012, FDA followed with GFI #209, which includes two key principles:

The use of medically important antimicrobial drugs in food- producing animals should be limited to those uses considered necessary for ensuring animal health.

The use of medically important antimicrobial drugs in food-producing animals should be limited to those uses that include veterinary oversight or consultation.

This was followed in 2013 by GFI #213, which gives more specifics on implementing the principles of GFI #209. It defines "medically important" and lays out a process and data requirements for updating product labels. Medically important antimicrobials in food animals for use in feed and water:

- Can no longer be used for growth promotion or feed efficiency.
- Can no longer be acquired over the counter.
- Require veterinary oversight. Feed uses require a Veterinary Feed Directive (VFD), and water uses require a prescription.

These requirements go into effect January 1, 2017. A livestock or poultry producer will need a VFD order (like a prescription) from a veterinarian to buy a feed or mineral containing a VFD drug.

Some drugs will no longer be available over the counter, including chlortetracycline for uses such as in feed or minerals for anaplasmosis control, medicated milk replacer, and feed and water antibiotics for poultry. By law, a veterinarian and a livestock producer must have a relationship called a Veterinary Client Patient Relationship (VCPR) to issue a VFD or a prescription. The VCPR is defined in state veterinary practice acts and in federal law. Veterinarians will need time to become familiar with a livestock operation before they can legally establish a VCPR. Producers who do not already have a relationship established with a veterinarian should do so now so that they are ready.

For more information, go to www.LSUAgCenter.com and search for animal health.

Christine B. Navarre is the LSU AgCenter extension veterinarian.

Feasibility of Grain Sorghum Ratoon Cropping in North Louisiana

Rick Mascagni

Grain sorghum is often used as a rotation crop with soybeans and cotton. The most important management practice is planting date, and early planting maximizes yield and enhances the ability to "ratoon" or produce a second crop from the original stubble. For a ratoon crop to be practical, enough time is required after the main harvest for the second harvest to develop and dry down. The yield potential of both the first and ratoon crops and input costs associated with insect and disease management, particularly for the late-developing ratoon crop, need to be determined in order to fully evaluate the viability of a ratoon-cropping system.

Field experiments were conducted on Commerce silt loam in 2013 and 2014 and Sharkey silty clay in 2015 to evaluate the feasibility of ratoon-cropping sorghum in northeast Louisiana. The official variety trials were used each year for evaluating treatment effects. Hybrid entries numbered 24 in 2013, 29 in 2014, and 31 in 2015. Cultural information is presented in Table 1. Because of severe bird damage, the 2013 trial had to be replanted. The ratoon crop began developing after the main crop stubble was mowed the day after harvest. The main crop was fertilized with 150 pounds of nitrogen per acre, and the ratoon crop was fertilized with 100 pounds of nitrogen per acre. Insecticides were applied whenever a pest reached threshold levels. The Sharkey silty clay trial in 2015 was irrigated.

Grain was harvested with a small-plot combine and weight was adjusted to 14 percent grain moisture. To avoid potential bird damage, particularly for the late ratoon crops, mesh bags were placed over the grain heads during the grain fill period for four hybrids in 2015 to ensure a true yield without bird damage. These heads were hand-harvested and threshed with a small mechanical thresher, and yield was adjusted to 14 percent grain moisture.

Table 1. Cultural information for main and ratoon crops in St. Joseph, 2013-2015.

	Main Crop		Ratoon Crop		
Year	Planting date	Harvest date	Mowing date	Harvest date	Freeze date
2013	April 18	August 8	August 9	November 20	November 13
2014	April 11	August 21	August 22	Not harvested	November 2
2015	April 1	July 28	July 29	November 17	November 23

The 2014 ratoon crop was not harvested because of incomplete grain development resulting from an early freeze. Additionally, time between planting and harvesting the main crop was 132 days compared to 112 days in 2013 and 118 days in 2015, leaving fewer days for the ratoon crop to develop.

Yields averaged 109 bushels per acre in the main crop and 14 bushels per acre in the ratoon crop for the 24 entries in 2013 and 104 bushels per acre in the main crop and 21 bushels per acre in the ratoon crop for the 31 entries in 2015. Thus, the ratoon crop equaled only 13 percent of main crop yield in 2013 and 20 percent of main crop yield in 2015.

A ratoon-cropping test at the Northeast Research Station, St. Joseph. Photo by Rick Mascagni

Grain yield and yield components for both the main crop and ratoon crop for the four hybrids with bird protection were evaluated. The main crop was combine-harvested and the ratoon crops were hand-harvested and threshed. Yield for the four hybrids averaged 106 bushels per acre for the main crop and 54 bushels per acre for the protected ratoon crop. Although yields were higher when grain was protected from bird damage, they still were only about 50 percent of main crop yield.

A major concern about the feasibility of sorghum ratoon cropping is the costs for pesticide applications. Multiple applications were applied each year on the ratoon crop for insect pests, including aphids, armyworms and sorghum midge.

Producing a second crop requires timely planting and harvesting of the main crop to best ensure that the ratoon crop has time to completely develop and dry down. The yield potential and the need for multiple pesticide applications for the ratoon crop suggests that grain sorghum ratoon cropping may not be feasible for northeast Louisiana.

Rick Mascagni is a professor at the Northeast Research Station in St. Joseph.

Field Days and Career Fairs

Help Youth See Opportunities in Agriculture

Tara P. Smith, Terri Crawford, Lekeisha Lucas-Powell,
Ashley Powell, Lanette Hebert and Steve Linscombe

Agriculture is a leading economic driver in Louisiana, forming the backbone of the economy in many regions across the state. Total gross farm-gate value for Louisiana agriculture was estimated at just over $6.5 billion in 2015, with value-added exceeding $12 billion. The centers of agriculture are primarily located in the northeastern, southwestern and south central regions of Louisiana, whereas, the southeast region is a hub for horticulture enterprises and the northwest region is a center for forestry and related enterprises. Agricultural producers, their families and everyone affiliated with agriculture understand the hard work, dedication and struggles involved in producing the commodities that sustain each of us and the way of life we have to come to know. LSU AgCenter research and extension programs continue to contribute to the sustainability of agricultural enterprises across the state.

According to the U.S. Department of Agriculture Economic Research Service, U.S. agriculture and related industries contributed about $835 billion or 4.8 percent toward the Gross Domestic Product in 2014. Approximately 17 million U.S. workers, or about 9 percent of the total U.S. workforce, are employed in industries that relate to food and fiber. During the next five years, it is expected that over 57,000 jobs will be available annually for graduates with a bachelor's degree or higher in areas pertaining to food, agriculture, renewable natural resources, the environment and other related disciplines. Many American consumers do not have a fundamental understanding of agriculture or how it touches their lives. To meet the challenges of the future, it is imperative that youth and adults increase their understanding and knowledge of agriculture.

The LSU AgCenter Northeast and Southwest regions have been conducting agricultural awareness educational programs through youth-targeted field days and career fairs. Through a collaborative effort of research and extension faculty and staff in the Northeast Region, the first-ever LSU AgCenter Youth Field Day was held at the Sweet Potato Research Station in Chase in April 2014. The idea for the event grew from a question posed by Lakeisha Lucas-Powell, 4-H agent in East Carroll Parish, who asked if research stations conducted tours to provide youth a better understanding of agriculture in the region. From that one question the concept evolved into what is now an annual field day to introduce youth to real-world agriculture and provide them with the opportunity to learn more about agricultural production, technology, research and career opportunities. Almost 200 students from 12 parishes in the region participated in the event in 2014, and more than 275 youth participated in 2015.

LSU AgCenter molecular geneticist Herry Utomo explains the work he conducts using analysis of DNA in rice to improve quality of new rice varieties as part of the April 21 career day. Photo by Bruce Schultz

Students attending the Northeast Youth Field Day on April 29, 2014, at the Sweet Potato Research Station watched a drone demonstration and learned how farmers use drones. Photo by Tobie Blanchard

The 2014 youth field day focused on sweet potato, soybean and wheat production and featured agriculture equipment, the use of drones in agriculture and agricultural career opportunities. Field tours in 2015 highlighted beef and forage production, sweet potato production and agricultural best management practices and featured educational opportunities and degree programs offered through the LSU College of Agriculture. A career fair presented information from AgCenter faculty and staff, agricultural consultants, extension agents, representatives of the processing sector and a veterinarian.

The 2015 Southwest Region career day at the H. Rouse Caffey Rice Research Station featured rice breeding and production practices, environmental and coastal programs, renewable natural resources and agricultural engineering. The event also provided information on the LSU College of Agriculture. Exhibitors included farm lenders, seed companies, the Natural Resources Conservation Service, USA Rice Federation, LSU AgCenter extension and 4-H representatives, and the Louisiana Department of Wildlife and Fisheries. In 2016, interactive workshops highlighted food science and nutrition programs, agricultural engineering, animal sciences and agronomy, as well as College of Agriculture degree programs and opportunities for prospective students.

Shelby Thibodeaux, of St. Mary Parish, reacts after reaching inside a cow's rumen to feel digested grass at the April 21 career day. Photo by Bruce Schultz

Courtney Garber, of Acadia Parish, looks at an experiment being conducted in the lab of agronomist Dustin Harrell as part of the Southwest Regional Agricultural Career Day on April 21, 2016, at the H. Rouse Caffey Rice Research Station in Crowley. Photo by Bruce Schultz

Field days aimed at youth have been successful and serve as a model to inform youth about the value and importance of agriculture. In 2015, 85 percent of participants at the Northeast Region Youth Field Day indicated that the experience would be helpful in making career decisions, with more than 70 percent indicating they were interested in pursuing an agriculture-based career. More than half of those who participated signed up to be contacted by an LSU College of Agriculture recruiter. In 2016, 65 percent of youth participating in the Southwest Region career day indicated the experience would be helpful as they begin making career decisions, with 56 percent agreeing they were interested in pursuing a career in agriculture.

The agricultural sector is a large employer, and all facets of the industry are actively seeking qualified individuals to fill critical positions in research, extension, teaching, technical fields, industry and business operations. Youth field days will continue to be an important mechanism to reach youth and inform them about what agriculture has to offer.

Tara P. Smith is AgCenter Northeast Region director, Terri Crawford is Northeast Region 4-H and family and consumer science coordinator, Lekeisha Lucas-Powell is a 4-H agent in East Carroll Parish, Ashley Powell is a 4-H agent in Catahoula Parish, Lanette Hebert is Southwest Region 4-H coordinator, and Steve Linscombe is Southwest Region director and American Cyanamid Professor for Excellence in Plant Genetics, Breeding and Variety Development.

Sweet Potato Foundation Seed Production and the National Clean Plant Network Support

Christopher A. Clark and Tara P. Smith

The LSU AgCenter sweet potato foundation seed program began operations at Chase, Louisiana, in Franklin Parish in 1949 with an emphasis on providing high-quality seed roots to the Louisiana sweet potato industry. At that time, seed roots were cut, and those found free of interior flesh color mutations were planted in a greenhouse to produce plants for field plantings. Individual plants demonstrating good yield and uniform root size were selected at harvest to use for the following year's foundation seed production.

In 1999, the foundation seed program was converted to a virus-tested production system for seed roots. Research during the intervening period showed that the viruses that normally accumulate in sweet potato planting material in Louisiana could reduce yields of the Beauregard variety by 25 percent to 40 percent and could also negatively affect shape and skin color of the roots. Since the inception of virus-tested seed production, it has been an ongoing learning process to identify steps to produce planting material that is as free as possible of harmful viruses. This is important for a location where virus-infected sweet potatoes were grown for 50 years and where perennial morningglories, which are alternative hosts for the same viruses, have existed for many generations.

Since 1999, the only sweet potatoes grown on the Sweet Potato Research Station were either derived from true seed (sweet potato potyviruses are not thought to be transmitted through botanically "true" seed), from virus-tested tissue cultures or from seed roots produced at the station during the previous year. However, a study from 2007 to 2009 comparing yield and infection of different generations of seed indicated that foundation seed had from 20 percent to 80 percent reinfection, usually with a single virus. Subsequent generations of seed were nearly all infected with one and often multiple potyviruses.

Four viruses commonly infect sweet potatoes in Louisiana, and all are members of the same group of plant viruses (potyviruses) that are transmitted by aphids or in vegetative planting material. These are: Sweet potato feathery mottle virus (SPFMV) (Figure 1), Sweet potato virus C (SPVC), Sweet potato virus G (SPVG), and Sweet potato virus 2 (SPV2). These viruses are each spread by aphids in a nonpersistent manner, which means that an aphid can acquire the virus from an infected plant within seconds to minutes of feeding and can transmit the virus to a healthy plant immediately. Thus, these viruses can spread very rapidly when infected plants are present. Previous research showed that infection of Beauregard sweet potatoes with any one of these viruses causes minimal effect on the plant, but as the plant becomes infected with two, three or all four viruses, yield declines. Subsequent research conducted on other commercial varieties, including Bayou Belle, Orleans and Evangeline, indicates that they, too, exhibit similar yield declines when infected with multiple potyviruses.

Challenges remain for providing healthy sweet potato plants at the farm level because of the rapid rates of reinfection with the complex of potyviruses that contribute to cultivar decline. Beginning in 2010, efforts were put in place to address reinfection of foundation seed at the station. Several strategies have been employed, including producing seed used for research at an isolated off-site location, aggressive herbicidal control of morningglories focusing on perennials, and in 2014 and 2015, removing plants with virus symptoms in selected seed-production fields. Since 2012, virus-tested plants grown in the greenhouses at the station have been used to plant small fields at the

Figure 1. Sweet potato plants showing symptoms characteristic of potyvirus infection. Photo by Christopher A. Clark

Table 1. Results of indexing for potyviruses of sample lots of seed roots produced at the Sweet Potato Research Station.

	2012	2013	2014	2015
Number of seed lots tested	2	18	18	16
Number of seed lots with infected roots	2	10	3	1
Number of seed roots tested	125	523	745	380
Range (percent) of seed roots infected	7-21	0-42	0-2	0-4
Overall mean percent of seed infected	14.0	9.0	0.8	0.3

Northeast Research Station in St. Joseph, where sweet potatoes are not routinely produced. Roots from these fields were harvested and planted for use in research plots at the Sweet Potato Research Station the following year to produce plants for research. These seed roots were tested in 2012, 2013 and 2014 by grafting them to the Brazilian morningglory, *Ipomoea setosa*, to test for the presence of sweet potato viruses. No virus reinfection was detected in seed produced for research at the Northeast Research Station during those seasons.

Shoots from sample lots of seed roots produced at the Sweet Potato Research Station were also grafted onto indicator plants during each winter to determine incidences of reinfection. From 2012 to 2014, this was done by grafting on I. setosa. In the meantime, a test that amplifies and detects the nucleic acid of viruses was found not only to be far less time consuming but also slightly more accurate in detecting the potyviruses in storage roots. This approach replaced grafting in 2015. Ten of 18 seed lots from different fields and cultivars produced in 2013 had seed roots in which potyviruses were detected by indexing on the indicator host *Ipomoea setosa*, and incidence ranged from 3 percent to 42 percent of roots (Table 1).

During 2014, 24 plants with virus symptoms were removed from seed fields from early June to late August. These plants were near an infected perennial morningglory growing along a highway right of way. Three of 18 seed lots produced in 2014 included infected roots with incidence of 1 percent to 2 percent in each of those lots (Table 1). No symptomatic plants were found in seed fields in 2015, and only one seed lot included a single infected root (Table 1). Efforts are ongoing to identify best management practices for producing virus-tested foundation seed at the station.

In 2015, a National Clean Plant Network for Sweetpotatoes (NCPN-SP) was formed as part of a larger group of networks for other specialty crops, including, grapes, fruit trees, citrus, hops, berries and roses. Changes in foundation seed operations and membership in NCPN-SP have positively affected outcomes in the AgCenter sweet potato foundation seed program. Specifically, through efforts associated with the National Clean Plant Network, production of virus-tested sweet potato vine cuttings of AgCenter-developed cultivars is increasing. This allows the station to increase the flow of clean material to the Louisiana industry and to cooperators in other states that lack the infrastructure to support production of virus-tested plants. AgCenter researchers are also enhancing virus-testing capabilities by implementing a nationally standardized protocol for target viruses adopted at the 2015 NCPN-SP virus workshop and expanding the capacity to use existing assays to more thoroughly test plants in the foundation seed system.

The National Clean Plant Network is an outlet to share techniques for tissue culture and virus indexing and also to share clean germplasm. In addition, it is providing funds for critical needs to improve infrastructure and foundation seed production systems in Louisiana and other clean plant centers across the United States. In 2015 and 2016, supplemental lighting was installed in the Sweet Potato Research Station tissue culture receiving greenhouse, which will allow for a more rapid increase of plants (Figure 2). Through extension and outreach, the network provides an additional framework to provide information on the value of clean plant systems to AgCenter stakeholders, the sweet potato industry and end users.

Figure 2. Research is enhanced through the new and improved greenhouse at the Sweet Potato Research Station. Photo by Tara P. Smith

Christopher A. Clark is a professor in the Department of Plant Pathology and Crop Physiology, and Tara P. Smith is director of the Northeast Region and research coordinator at the Sweet Potato Research Station.

The LSU AgCenter keeps a herd of Savanna goats, which are meat-producing goats, at the Central Research Station in Baton Rouge. Photos by Olivia McClure

Economics of Southeastern U.S. Meat Goat Production

Berdikul Qushim, Jeffrey M. Gillespie and Kenneth McMillin

The U.S. meat goat industry has expanded significantly since the early 1990s with the majority of meat goat production located in the Southeastern region. The extended grazing period, amenable weather, less expensive goat housing, and lower dependence on conserved or stockpiled forages make for a favorable environment for meat goat production in the Southeast. The economics of U.S. meat goat production has been studied little, with the consequence that there is limited information on the subject. Research was carried out on meat goat production costs and returns and production efficiency of Southeastern U.S. commercial meat goat producers.

LSU AgCenter researchers surveyed Southeastern U.S. meat goat producers by mail to gather information about their costs and returns associated with meat goat production. Southeastern states included in the survey were Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Eastern Oklahoma, South Carolina, Tennessee, Eastern Texas, Virginia and West Virginia. The sample for this study included 61 farms across the South, including six in Louisiana. The cost analysis for Southeastern U.S. meat goat production is based on three meat goat operation sizes—small, medium and large, depending on acres of goat production land, number of breeding does, and number of meat goats.

The farms were further defined as those with goat sales greater than 50 percent for slaughter, those with goat sales greater than 50 percent for breeding or show, and those with goat sales greater than 50 percent for purposes other than slaughter, breeding or show. In the sample, 32 percent were slaughter, 33 percent were breeding or show, and 35 percent were "other." Among size categories, the percentages did not differ significantly. Thus, any differences in cost structure among those segments would not be expected to strongly impact cost differences by size.

Southeastern U.S. meat goat farms are on average operating at an efficient operation size if the farm's scale of production is greater than 60 goats or greater than 40 breeding does.

In analyzing production costs, variable expenses are those expenses that vary along with the amount produced, such as feed or veterinary services. Fixed expenses are those that do not vary with the amount produced, such as insurance and depreciation on equipment. The study results indicate that meat goat total, variable and fixed expenses per acre for large-sized farms were lower than for small-sized farms. Furthermore, total, variable and fixed expenses per acre for large-sized farms were lower than for medium-sized farms, and medium-sized farms had lower variable and total expenses per acre than did small farms. These results indicate that increasing the size of meat goat farms leads to lower costs per acre.

Meat goat enterprise total and fixed expenses per breeding doe for large-sized farms were lower than for small-sized farms. These results indicate that increasing the size of meat goat farms leads to lower costs per breeding doe.

Meat goat total and variable expenses per meat goat produced on medium- and large-sized farms were lower than for small-sized farms. Meat goat fixed expenses per meat goat produced on large-sized farms were lower than for small-sized farms. These results indicate that larger meat goat farms had lower costs per meat goat produced.

Scale efficiency is the potential productivity gain from achieving an opti-

Goat Farm Size			
	Small	Medium	Large
Acres in Goat Production	<10	=>10 - <30	=>30
Number of Breeding Does	<15	=>15 - <30	=>30
Number of Meat Goats	<25	=>25 - <45	=>45

mally sized farm. The results of an efficiency analysis of Southeastern U.S. meat goat farms show an average technical efficiency of 0.81, which means that the average Southeastern U.S. meat goat farm could reduce about 19 percent of total inputs to produce the same output as a fully efficient farm. This suggests there is much room for more efficient input usage. Results on economic performance measures such as the estimated "returns to scale" for Southeastern U.S. meat goat enterprises show that a 10 percent increase in all outputs resulted from increased overall input use of 7.9 percent, suggesting that farms can become larger and reduce input usage per meat goat produced. A measure of "scale efficiency" indicates that Southeastern U.S. meat goat farms are on average operating at an efficient operation size if the farm's scale of production is greater than 60 goats or greater than 40 breeding does. This means that any reduction of farm operation size below those numbers will make the farm less "scale efficient."

All of these efficiency and cost analyses show that the size of a meat goat operation is important in determining its competitiveness. In this study, the average farm producing 60 goats farmed about 40 acres in goats, which is a relatively small farm by U.S. standards.

Results from this study suggest that extension educational efforts could result in greater increases in farm efficiency if directed to small-scale producers who are full-time farmers, those who are less specialized in meat goat production, and those who have lower education levels. Extension education can help and encourage small-scale meat goat farmers with low technical efficiency levels to use information on new technologies and better farming practices to improve farming efficiency and productivity.

Editors Note: Tables providing the numbers used in the analysis are at www.LSUAgCenter. com. Go to Louisiana Agriculture magazine and then Summer 2016 issue.

Berdikul Qushim is a research associate, and Jeffrey M. Gillespie is the former Martin D. Woodin Endowed Professor in the Department of Agricultural Economics and Agribusiness. Kenneth McMillin is Mr. and Mrs. Herman E. McFatter Endowed Professor in the School of Animal Sciences.

Goat Production Grows in Louisiana

Johnny Morgan

Louisiana is not known as a major goat-producing state. But for those interested in the industry, there is a market for their animals, according to LSU AgCenter animal scientist Ken McMillin.

"Goat producers in Louisiana numbered about 600, with a total inventory of 19,000 head of meat goats as of January of this year," McMillin said, adding that these figures are from the 2014 LSU AgCenter Ag Summary.

One reason Louisiana is not a major goat producer can be attributed to the weather conditions in the state.

"Goats tend to do better in dry, arid conditions, which is the reason that over 38 percent of the meat goat production is in the hill country of Texas," he said.

The size of the industry was even smaller before Hurricane Katrina caused an influx of Hispanic and Muslim residents to New Orleans.

Consumption of goat meat is more of a cultural or ethnic commodity, McMillin said. "About 50 percent of the meat consumed here is imported from Australia – the world's largest exporter."

The one major goat processor in the state, Rouchers, in Plaquemine, is now slaughtering about 500 head per week, even though the Muslim holy month of Ramadan ended July 18, he said. That's about 50 percent higher than their weekly average throughout the year.

Ramadan is a time of fasting from dawn to sundown, when food and drink can be consumed moderately, but there are larger meals on the weekends and feasts at the end of the religious holiday.

"Rouchers now has four Muslim buyers who come in and slaughter goats and take the carcasses primarily to New Orleans," he said.

The small size of the goat industry in Louisiana has proven to be a disadvantage because it is less organized than other meat industries.

Another disadvantage to the goat meat industry is that for most meat animals, the processors are located close to the areas of production, but not goats.

New Jersey is the largest slaughter state for goats, McMillin said. "As far as rankings go, Texas is No. 1 in meat goat production, followed by Tennessee and Oklahoma. Louisiana comes in at 26."

When looking at preferences, there are quite a few. Louisiana consumers prefer fresh goat meat but will purchase frozen meat imported from Australia.

On the West Coast, Asian consumers prefer skin-on goat meat, much like pork is traditionally processed, McMillin said.

McMillin said most of the extension publications on goat production have been developed at 1890 land-grant institutions, including Langston University in Langston, Oklahoma; Tuskegee University in Tuskegee, Alabama; and Alabama A&M University in Huntsville, Alabama.

Southern University animal scientist Sebhatu Gebrelul and veterinarian Dr. Renita Marshall have ongoing goat projects at their university, which is also an 1890 institution.

"One of the highlights of our program is a new grant from the Louisiana Department of Agriculture and Forestry that will provide for a Master Small Ruminant certification similar to the Master Cattleman and Master Farmer programs," Gebrelul said.

The grant also will provide funds for a mobile unit that will allow scientists to take their expertise to the parishes instead of producers having to come to Baton Rouge for conferences.

The three-year grant will consist of three levels that will require 20 hours of training in business development, nutrition, marketing and record-keeping.

Johnny Morgan is a communications specialist with LSU AgCenter Communications.

Burden Museum & Gardens

Celebrates 50 Years Since Original Land Donation

Windrush House at the Burden Museum & Gardens. Photo courtesy of LSU Strategic Communications

Rick Bogren

Surrounded by Louisiana's capital city and bounded on two sides by interstate highways, the Burden Museum & Gardens is an oasis of tranquility. Home to the LSU AgCenter Botanic Gardens, the LSU Rural Life Museum and Windrush Gardens, Burden is 440 acres that comprise forested green space, formal gardens and agricultural research plots.

Once called Windrush Plantation, the property was acquired in the mid 1800s by the Burden family, who began donating the property to LSU 50 years ago in 1966 until the final parcel was given in the early 1990s.

The recorded history of the Burden property goes back to 1812, when William and Francis Thomas acquired approximately 648 acres through a U.S. government land grant. William S. Pike Sr. purchased a 600-acre tract in 1861.

This is where the Burden family story begins.

William Pike's niece, Emma Barbee, married John Burden in 1856.

John built the Burden house and named the property Windrush because it reminded him of an area of England where he grew up. Although the Burdens used the property, ownership remained in the Pike family.

William Pike died in 1877, and his widow, Mary Ann Huguet Pike, died in 1904, when the Pike heirs inherited considerable land in the Baton Rouge area. The 600-acre Windrush property was sold in December 1905 to William Pike Burden. The third son of John and Emma purchased the land where his parents had resided but never owned.

Burden property goes back to 1812, when William and Francis Thomas acquired approximately 648 acres through a U.S. government land grant

William Burden married Ollie Brice Steele in 1895, and they had three children – Ione Easter born in 1896, William Pike Jr. (known as Pike) born in 1898 and Ollie Steele (known as Steele) born in 1900. The Burdens lived in Baton Rouge and used Windrush as their country home until 1921, when they renovated the house and moved there permanently.

William Sr. died four years later, leaving one-half of Windrush to his wife and one-sixth to each of the children. "Miss Ollie" and the children continued living in the Burden house.

Miss Ollie died in 1958.

Ione spent most of her career at LSU and was director of student activities from 1948 to 1961. She never married and lived at Windrush with Miss Ollie and her brother Steele. Ione died in 1983 and left her share of the family property as well as stocks and cash to the Burden Foundation.

Pike attended LSU but never graduated. He enlisted in the Army Air Corps

Burden is 440 acres that comprise forested green space, formal gardens and agricultural research plots.

during World War I and later started a successful printing and publishing business. Pike married Jeanette Monroe in 1922, and they built a small home on the Windrush property. In 1940 they built the West Indies-style house that remains the Monroe home today.

Pike died in 1965, and when Jeannette died, she left a five-acre tract that includes the West Indies house to her nephew, John Monroe. It remains privately owned and not part of the Burden Museum and Gardens.

Steele was the master planner for Windrush. He was a painter and sculptor and was best known as a landscape designer. He laid out the Windrush Gardens as well as the design for the Windrush Plantation, including lakes, roadways and allees.

Steele worked for Baton Rouge City Park until 1940 and was on the LSU staff part time beginning in 1930 and later as a full-time employee, developing and maintaining the campus landscape until retiring in 1970.

In 1961 Ione, Pike and Steele established the Burden Foundation and placed the Windrush property in it. By 1965 they had donated 30 acres to the Franciscan Sisters, who established Ollie Steele Burden Manor, a nursing care facility for the elderly.

The LSU connection began in 1925 when LSU professor John Gray, an early authority on soybeans, established experimental plots on Windrush Plantation. Other College of Agriculture researchers soon followed.

LSU had been renting land on the Windrush Plantation for more than 20 years when the Burden Foundation donated the first 50 acres to LSU in 1966.

Succeeding donations to LSU were made in increments, with the property designated to be used for horticultural and agronomic research, for development of the Rural Life Museum and as a green area.

When LSU accepted the first donation, the Agricultural Center appointed Louis Anzalone as the first resident director. He was responsible for fencing the property and installing irrigation in the open fields.

Over the years, the focus of research at Burden Center has changed. In 1979, when Warren Meadows was appointed resident director of the Burden Research Plantation, as it was known then, research included soybeans and other agricultural crops.

Current research at the Botanic Gardens includes trials to evaluate the performance of landscape bedding plants and vegetables, with warm-season and cool-season plants rotated in approximately 5,000 square feet of raised beds.

In addition, the Botanic Gardens is home to trials to evaluate various varieties of tomatoes, sweet potatoes, strawberries and many other commercial and home garden vegetables and fruits.

The 3.5-acre Windrush Gardens was Steele Burden's personal laboratory for garden design where he worked on expanding and refining his masterpiece from his 20s until his death in 1995. Windrush Gardens is accessed through the Rural Life Museum.

Over the intervening years, the cultivated garden area has grown to about 15 acres but still is in keeping with Steele Burden's original design.

In 1970, Steele began moving the first of many structures to the property to establish what is now the Rural Life Museum. The initial buildings came from Welham Plantation in St. James Parish. The museum now comprises a plantation area and an upland South area with plans underway to add an Acadian area.

LSU connection began in 1925
LSU professor John Gray, an early authority on soybeans, established experimental plots on Windrush Plantation.

This is a photo of Steele and Ione Burden. The year it was taken and the photographer are unknown. Photo courtesy of LSU Strategic Communications

Pat Hegwood was resident director at Burden in 2000 when the Baton Rouge Junior League and Baton Rouge Green joined with the Burden Center to develop a walking trail through the property. Although delayed by Hurricane Gustav, Trees and Trails was formally opened in 2009.

During Hegwood's tenure, Burden accepted the donation of the Violet and Henry Stone Camellia collection, which included 500 named camellia varieties along with upwards of 300 unnamed varieties transplanted from the Stones' residence in Baton Rouge.

Under the leadership of Jeff Kuehny, who was named resident director in 2010, the Botanic Gardens has developed close relationships with many local organizations, including the East Baton Rouge Master Gardeners, Baton Rouge Camellia Society, Baton Rouge Bonsai Society, Baton Rouge Hibiscus Society, Baton Rouge Herb Society and the Baton Rouge Rose Society.

Today, the Botanic Gardens includes the Barton Arboretum, a Memorial Live Oak Garden, the Steele Burden Memorial Orangerie and the Ione E. Burden Conference Center.

Rick Bogren is a science writer with LSU AgCenter Communications and associate editor of Louisiana Agriculture.

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