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LOUISIANA Agriculture

Assuring Our Future Through Scientific Research and Education

Whooping cranes return to Louisiana

LSU AgCenter Research & Extension

AgCenter expertise sustains growth, diversity in Louisiana agriculture


Bill Richardson

Louisiana's rice, cotton, corn, soybeans, sugarcane and grain sorghum crops all set yield records in 2012. It was also a good year for animal enterprises with poultry's value going up 15 percent and the cattle industry's value increasing by 25 percent over 2011.

"Producers are constantly telling us that we are a major partner in their operations and without our help, they probably would no longer be in business," said Bill Richardson, LSU AgCenter chancellor.

Richardson said the LSU AgCenter's expertise is relied upon by one of the most diverse crop offerings in the United States.

"Louisiana farmers grow just about everything from row crops to crawfish. But as in most Southern states, forestry is the leading agriculture industry statewide. The AgCenter plays a major role in supporting all of Louisiana's agricultural industries and managing our natural resources," he said.

The chancellor said the AgCenter's prominence in the state's agriculture industry is the result of dedication of the scientists and extension agents.

"Our scientists use innovative technology transfer methods to put best management practices in the hands of Louisiana's agricultural stakeholders," Richardson said. "We provide top-flight research to help keep Louisiana producers profitable."

Each year the LSU AgCenter tests commercial cotton, corn, soybean, rice, sugarcane, wheat, oat and grain sorghum varieties. Results are published to help growers make decisions before planting.

The LSU AgCenter's plant protection programs in entomology, pathology and weed control are developing new ways to combat pests to maintain yields.

"A major reason we have not experienced severe herbicide-resistant weed problems is because our specialists were able to get ahead of this dilemma and educate growers," Richardson said. "Our scientists have shown growers how to incorporate seed treatments for their crops to prevent insect infestations and to decrease the amount of pesticides used during the season. They have helped farmers obtain federal approval for fungicides to control plant diseases."

Critical to the future of Louisiana agriculture is exploring the potential of new crops. The AgCenter is a partner in a $17 million U.S. Department of Energy grant aimed at studying the possibility of growing sweet sorghum and "energy" sugarcane to be converted into ethanol and other industrial products.

But even the top-notch research conducted by the LSU AgCenter would be of no value if it didn't reach a target audience.

"We have an extension office and at least one agent in each of the state's 64 parishes. These agents provide educational information ranging from backyard gardening to managing a thousand acres in cultivation," Richardson said. "The AgCenter brings the expertise from the university to the doorstep of every state resident."

Richardson said extension offices provide services that go beyond farming. "Our programs benefit 4-H youth, improve quality of life, stimulate the local and state economy, create jobs and assure a strong return from the investments made in land-grant universities."

Additionally, the AgCenter provides strong research-based educational programs focused on healthy lifestyles.

"Fighting obesity, especially childhood obesity, is one of our program priorities. Proper diet and exercise can lead to reduced health care costs, a more productive workforce, stronger families and better communities," Richardson said.

Protecting the environment is an AgCenter educational goal. Richardson said the LSU AgCenter is a partner in the Louisiana Master Farmer, Master Cattle Producer and the Kellogg Master Rice Grower programs. "All of these programs help farmers voluntarily adopt environmentally sound practices without the imposition of governmental regulations. Several other states have modeled similar programs after ours."

The LSU AgCenter serves not only the state's agricultural industries but every one of its residents. From farming to forestry, natural resources to nutrition, and education to economics, AgCenter faculty recognize public need and work diligently to address problems with practical solutions. ■ **Bruce Schultz**

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On the cover: A whooping cane at the White Lake Wetland Conservation Area in Vermilion Parish. Photo by Johnny Saichuk

Feeds, forages topics at Franklinton field day

Scientists from the LSU AgCenter and Mississippi State University shared findings from research on forage and feed at a Southeast Research Station field day on April 5.

Highlights of the field day included ways to improve livestock nutrition programs and increase income that ranged from enhanced pasture management to replacing corn in the animal's diet with byproducts like soy hulls and citrus pulp, according to Mike McCormick, nutritionist and resident coordinator at the station.

One area of keen interest to the dairy producers was the possibility of a 10-fold increase in their profit margin by keeping dairy bull calves a little longer than normal.

"This project is to help generate some additional income for some of these dairies that are kind of strapped," McCormick said. "The bull calf is one that doesn't bring a lot of income. If a guy has 50 bull calves, he might get $500-$1,000 for all of them."

By using a small acreage of land and supplementing feed with some fairly inexpensive byproducts, the goal is to increase the income from those same 50 calves to $5,000 to $10,000.

McCormick has been supplementing citrus pulp, soy hull pellets and whole cotton seeds to sharply increase weight gain, which means more money in the pocket of the producers because these feeds are considerably cheaper than corn and soybean meal.

When discussing forage for cattle, the thought of planting mustard, turnips and other types of greens may not come to mind, but LSU AgCenter agronomist Kun-Jun Han is doing just that as a dual-purpose forage crop in beef and dairy production.

"We can graze it from early winter until spring. We can cut it for hay after it goes into the heading stage, and we can use it for soil renovation," Han said.

Han's research so far has shown that canola is proving to be the best of the plants for a number of reasons.

"First is the high protein, which ranges from 15-18 percent. Then there's its high digestibility factor," Han said. "And added to these benefits is the fact that we are able to plant a second crop of the canola after the first crop matures."

One problem that continues to plague cattle producers when making their first cutting of bermudagrass hay is an abundance of winter annual weeds such as clovers, curly dock and ryegrass, said LSU AgCenter forage specialist Ed Twidwell.

"We've found that you really need to get an early start on these weeds if you want to be effective," Twidwell said. "We put these treatments out on Feb. 14, which may seem kind of early, but we want to do that while the bermudagrass is still dormant."

Twidwell said he put out several different herbicides, and he found that the most effective treatment was with Pastora, which is a relatively new chemical.

Mississippi State University researcher Daniel Rivera discussed his findings of a study that looked at how administering feed supplements affected pasture quality.

"The main goal of this study was to look at the efficiency of nitrogen utilization by cattle," Rivera said. "We're looking at the most efficient way to deliver nitrogen to the pasture, whether by giving supplements to the cattle or by fertilizing the pasture."

In terms of nitrogen replacement, he found that feed supplements might be an alternative. However, he said this is only part of the story because potassium and phosphorus were not looked at.

For the first time in a number of years, the futures price of corn is below $7 per bushel, according to LSU AgCenter economist Ross Pruitt.

"That's good news for producers, but the bad news is that corn is not in the ground, and it hasn't been harvested yet," Pruitt said. "So don't get your hopes up just yet."

Corn acreage is up this year. If the crop is good, prices should be favorable for beef and dairy farmers who depend heavily on corn for feed. ■ **Johnny Morgan**

Mike McCormick, resident coordinator at the LSU AgCenter Southeast Research Station, discussed the research project that showed dairy producers the possibility of a 10-fold increase in their profit margin by keeping dairy bull calves a little longer than normal and feeding lower cost byproducts like citrus pulp and soy hulls. Photo by Johnny Morgan

Urban farms bring fresh food closer to city tables

New Orleans is famous for its food. Fried seafood, rich gumbos and spicy etouffees are some of the city's staples. But healthier fare is making its mark on the city's landscape in the form of urban farms.

Arugula, beets, basil and parsley are popping up in small plots and even on rooftops like one above a Rouse's grocery store just blocks from the French Quarter. The rooftop garden uses towers and water, but no soil, to grow herbs and greens in an aeroponic system. The plant roots don't sit in water, but water is run through the towers periodically.

Marianne Cufone is executive director of Recirculating Farms Coalition and is working with innovative farmers who are using water instead of soil to grow their crops.

"It is outstanding for an environment like New Orleans because we can grow on rooftops, side lots, backyards, indoors and outside," Cufone said.

Amber Dawn, the intern farmer at Hollygrove Market and Farm in Uptown New Orleans, conducts a gardening lesson with students from Lafayette Academy Charter School. Photo by Tobie Blanchard

Using water instead of soil allows farmers to grow where soils may be contaminated, which was common in New Orleans after Hurricane Katrina. Cufone said a lot of available land may be an odd size, paved over or rocky. Rather than building soil beds and spending a lot of money on soil and materials, one can start a recirculating farm and use rainwater to supply it.

Cufone said a few restaurants are using recirculating systems to grow vegetables on site.

Uptown at Hollygrove Market and Farm, an aquaponic recirculating system using fish with crops sits among more traditional small vegetable plots. Hollygrove serves as an urban farm, local produce market and a community garden space.

Amber Dawn is an intern at the farm and oversees its programs for children. She is passionate about urban farming and teaching others to grow their own food.

"The more I learn, I take that information and hold my own workshops. People hire me to come to their gardens and show them how to garden and farm," Dawn said.

Hollygrove's "groasis" includes a small outdoor classroom, rabbits and chickens. She hosts local school children who come to learn several times a week. Dawn teaches them about gardening, plants, animals and healthful foods.

Parkway Partners is another organization working to build community gardens and urban farms in New Orleans. Program director Susannah Burley said exposing young people to urban agriculture shows them another career option.

"We don't have that many jobs for young people who are not bound for college, so there is a viable living to be made from urban farming," Burley said.

Burley sees New Orleans' diverse population embracing urban farming.

"The urban farmer could be anybody. It could be an 80-year-old. We have some retired folks who already had a full career who are farming," Burley said. "Then we have 22-year-olds who are urban farmers."

The urban farmer faces challenges that typical farmers may not. Space is limited, soil may be of a poor quality, and farmers are dealing with numerous crops. Andrew Loyd, a horticulture agent with the LSU AgCenter, is helping farmers recognize and overcome the challenges.

"You've got to know more crops, and you can't go out and fertilize them all the same like you do with one crop, such as sugarcane. You can't water them at the same rate as one agronomic crop being grown on a large scale." ■ **Tobie Blanchard**

Third-graders learn nutrition on iPads

Darion Dewhirst had never tasted a tomato before Beth Gambel brought her mobile iPad lab and bags of fresh vegetables to his school. Now the third-grader looks forward to trying new vegetables.

Gambel, an LSU AgCenter family and consumer science agent, is conducting the program "Body Quest: Food for the Warrior" at Chalmette Elementary School. The program uses characters drawn in the bold Japanese style called anime to challenge youth to develop healthy behaviors. The youngsters meet the warriors with names like Body Doc and Fiberlicious through lessons and games on an iPad app.

Dewhirst's favorite character is Muscle Max.

"I like to get muscles and be strong," he said. "I want to be like my dad and build something. But I'll be too weak because I've been eating so much junk. But if I've been eating healthier foods, then I would be able to build stuff."

Technology can keep youngsters sedentary, but the iPad app encourages the 35 third-graders to move more and eat better. Using the iPads and earbuds, the students navigate through the day's lesson independently.

"They're doing their work on their own. And then at the end when we follow up with questions about what have you heard or learned, we're reinforcing some comprehension," Gambel said.

The weekly lessons aim to fight childhood obesity by increasing fruit and vegetable consumption and physical activity, improving sleep habits and enhancing family environments.

The classes are held in conjunction with a physical education class. Chris McNamara, the phys ed teacher, says the mobile iPad lab Gambel brings is an exciting aspect of the program.

"If it's not something to do with electronics – keeping score on the scoreboard or something along those lines – they lose interest pretty quick," McNamara said. "So, having the iPads and having the program on the iPads, they look forward to that every week."

In addition to the iPads, Gambel also brings fresh vegetables each week. She said the more they taste vegetables, the more they come to like them.

"If you can make a change in one child – if one child eats it – then the kid next to him is going to try it. It's kind of a contagious thing," Gambel said.

During this lesson the students were introduced to the character Shining Rainbow.

"I learned that she likes to eat colorful foods because they are healthy and keep you active," said student Paige August.

Other characters encourage eating fiber and whole grains and drinking water.

The other schools participating in the program are Acadian Elementary New Vision Academy in Alexandria, Belle Rose Primary School, Farmerville Elementary School, Hicks High School in Leesville, Jones Elementary School in Minden, Mount Herman Elementary School and Newellton Elementary School.

The program is running for 10 weeks this year. Next year the AgCenter plans to expand the program to new schools and conduct it over 17 weeks. ■ **Tobie Blanchard**

4-H meets financial goals for new building at camp

The Louisiana 4-H Foundation has announced that it has met its financial goals to begin construction on the first phase of its multipurpose building at the Grant Walker 4-H Educational Center near Pollock, La.

Louisiana 4-H Foundation Director Jeff Bush said the advertisement for bid specifications for the first phase is nearing completion.

"We are anticipating announcing the winner of the construction bid process sometime this summer, with major construction to begin shortly after the summer camping program ends in August," Bush said. "We are planning to have a groundbreaking ceremony this summer."

Bush has begun working on the next phase of the building.

"We have an ambitious timeline for Phase II," he said. "We have received a generous challenge grant that will grow significantly if we meet the challenge criteria by the end of this year."

According to Bush, Phase II involves making the building climate-controlled, which will include installing heating and cooling units. The building will house an auditorium, the camp store, restrooms and storage for equipment used by 4-H'ers during camp.

Bush estimates it will take approximately $600,000 to meet the financial goals for Phase II. The total cost of the building is estimated to be $1.8 million, with most of the money being raised through private donations.

The growth in the number of 4-H camp participants was one of the primary reasons for constructing the building, Bush said. Currently, the center does not have space for activities or large gatherings during inclement weather. ■ **Craig Gautreaux**

New facility could boost Louisiana ag exports

Louisiana agricultural producers are highly dependent on the world market to sell their commodities, and a new export facility at the Port of Baton Rouge could increase the amount of ag products shipped abroad.

"For many of our major row crop commodities, exports are likely a major destination," said LSU AgCenter economist Kurt Guidry. "We don't have a lot of value-added processing for things like corn, grain sorghum, wheat and soybeans.

"So, given our geographic location and given the lack of alternative markets for many of our commodities, much of what we grow of those feed grains and oilseeds likely is destined for the export market."

According to figures from the U.S. Department of Agriculture, Louisiana had $1.6 billion worth of agricultural exports in 2011. Sugar was the No. 1 export product from Louisiana at $304 million in 2011. Rice was second at $264 million, followed by cotton at $242 million.

The International Trade Association shows China, Japan and Mexico as the top three buyers of Louisiana ag products.

The ITA statistics list the total exports shipped out of Louisiana in 2012 at $19.6 billion. That number is higher than the USDA figures because it includes all agricultural products, both grown in Louisiana and grown in other states and shipped out of Louisiana ports, Guidry said.

According to the U.S. Department of Commerce, Louisiana was one of 34 states to set record export levels in the first half of last year.

Louisiana's proximity to the Gulf of Mexico and the Mississippi River make it an ideal export terminus, Guidry said. "The Mississippi River and the ports have a big impact in terms of moving grain into the world market."

The after-effects of Hurricane Katrina and the shut-down of the Port of New Orleans demonstrated the importance of the Mississippi River corridor, he said.

The new tenant at the Port of Baton Rouge, Louis Dreyfus Commodities, is making $100 million in improvements to the grain-loading facility there, Guidry said. The end result should be increased amounts of grain loaded onto barges and ships.

The port anticipates the facilities should be ready to start receiving grain this year, and a possible benefit could be better prices for farmers who sell their grain there, Guidry said. "The hope is it will translate into higher prices because of the increased volume."

He said a new company in the area should bring more competition and better prices throughout south Louisiana.

Guidry said low water and siltation threaten the Mississippi River's ability to carry barge traffic. Last year, the port at Lake Providence had to close because low water levels hampered access.

"Proper maintenance of the river is essential," Guidry said. "Last year there was a combination of a lack of funds to maintain the river, plus the fact we were going through the drought."

Other port facilities also have a role in Louisiana's exports, including the Port of Lake Charles, where large amounts of rice are exported. ■ **Bruce Schultz**

Port of Baton Rouge. Photo by Bruce Schultz

Photo by Kathy Kramer

Education and Change in Louisiana

Mark J. Schafer, Don Asay and Amanda Cowley

For decades, Louisiana has ranked below the national average on several measures of education outcomes. Still, Louisianans have become more educated over the past three decades. LSU AgCenter researchers have studied educational trends in the state as well as the various efforts to improve education.

From 1990 to 2010, the percentage of high school dropouts in Louisiana declined from over 30 percent to less than 20 percent (Figure 1). Further, the decline started in the 1990s and continued through the 2000s at about the same pace. The percentage of high school and college graduates increased steadily over the same period. The percentage of high school graduates went from 52 percent in 1990 to 60 percent by 2010. The college graduates went from 16 percent in 1990 to 21 percent by 2010.

These are positive statewide trends. In comparison to other states, Louisiana is below average with higher proportions with less than a high school education (19 percent in 2005-2009 in Louisiana versus a national average of around 16 percent) and a smaller proportion of college graduates (21 percent in Louisiana versus about 28 percent nationally). Nonetheless, Louisiana's rate of improvement with lower proportions with less than high school completion and higher proportions with a bachelor's degree is consistent with national trends.

The high school completion rate improved significantly in Louisiana. On average, the mean parish high school completion rate increased from 63 percent in 1990 to 73 percent in 2005-2009. Parishes varied widely in terms of where they started in 1990 and how fast they improved. Ten parishes, mostly rural, had high school completion rates below

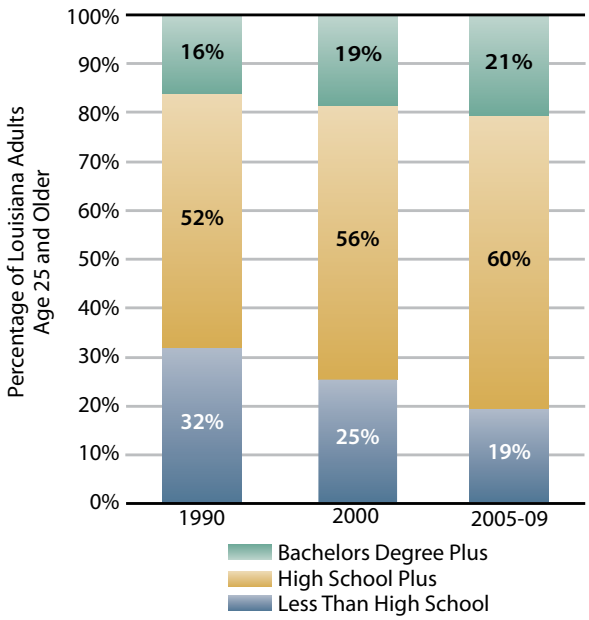

Figure 1. Educational attainment trends in Louisiana for adults 25 and older.

Category	Mean Completion Rate In percentages	High Completion Rate in Percentages	Low Completion Rate in Percentages
Male	75	88	54
Female	79	91	60
White	81	94	57
White Male	79	93	54
White Female	83	95	60
Black	69	87	47
Black Male	67	89	42
Black Female	72	88	48
Asian	77	91	57
Asian Male	81	95	53
Asian Female	74	92	46
Latino	66	92	24
Latino Male	61	90	30
Latina Female	73	94	13

Table 1. Mean, high and low parish high school completion rates from 2005-2009. Data from the American Community Survey by Gender and Race/Ethnicity Categories

55 percent in 1990. By 2005-2009, Allen Parish was the only parish with a high school completion rate under 60 percent. By contrast, five parishes – Ascension, Beauregard, Caldwell, Evangeline and Terrebonne – had high school completion rates exceeding 85 percent in 2005-2009.

The trends in high school graduation rate increases varied widely across Louisiana's parishes. From 1990 to 2000, 20 parishes saw declines in high school completion rates while 44 parishes saw improvements. In the 1990s, Assumption, Concordia, St. Martin and West Feliciana parishes saw the largest declines in high school completion, while Ascension, East Baton Rouge, Lincoln and St. Tammany parishes saw the largest increases. In the 2000s, Caldwell, Catahoula, Evangeline, Terrebonne and West Feliciana saw large increases of more than 20 percentage points. Bossier and St. Tammany parishes saw more than 10-percentage-point declines in their high school completion rates. Bossier Parish rates fell from 83 percent in 2000 to 68 percent in 2005-2009, and St. Tammany Parish rates fell from 84 percent to 73 percent during the 2000s.

Two key areas of focus in attempting to increase education in Louisiana have been school accountability and teacher qualifications.

High school completion rates in Louisiana also vary widely by race and gender (Table 1). In 2005-2009, the mean female high school attainment rate for all 64 parishes was higher than the mean rate for males. This "female advantage" is particularly true for Latinos, where the rate for females (73 percent) is 12 percentage points higher than for males (61 percent). However, the relationship between gender and educational attainment is reversed for Asians, where the mean graduation rates are higher for males (81 percent) than for females (73 percent). The Latina Female category provides the most striking comparisons, where 94 percent of Latina Females in Caddo Parish versus only 13 percent of Latina Females in East Feliciana Parish have a high school diploma or equivalency.

Two key areas of focus in attempting to increase education in Louisiana have been school accountability and teacher qualifications.

. . . Louisiana's rate of improvement with lower proportions with less than high school completion and higher proportions with a bachelor's degree is consistent with national trends.

Spending has also shifted. Budgets for subjects not tested – such as art, music and social sciences – have been cut so that schools can focus on improving test scores.

School Accountability

Louisiana introduced school accountability in 1998, which was expanded when the No Child Left Behind federal law was put into place in 2002. Over the past 10 years, No Child Left Behind has resulted in financial and organizational restructuring.

Financial Restructuring

State school accountability predated No Child Left Behind, and both led to increased expenditures for both administrative and adequacy costs. Administrative costs refer to testing implementation, accountability systems, highly qualified teacher systems and progress monitoring. Adequacy costs refer to funding for tutoring, summer school and supplementary services, and reducing student-teacher ratios. Overall costs increased dramatically as more schools failed to achieve accountability goals. Expenditures centered on bringing the lowest 5 percent of students up to proficiency through lower teacher-student ratios, tutoring and summer school.

Public school enrollment in Louisiana dropped from about 715,000 students in 2001 to 630,000 in 2009 (Figure 2). The big drop in 2005 is due to Hurricane Katrina. Nonetheless, per-student expenditures increased 65 percent from $6,700 to $11,100 during the same period. Spending has also shifted. Budgets for subjects not tested – such as art, music and social sciences – have been cut so that schools can focus on improving test scores.

Organizational Restructuring

In Louisiana during the 2002-2009 period, between 60 to 160 schools failed annually to meet adequate yearly progress, a term used in the No Child Left Behind legislation (Figure 3). States were responsible for identifying these schools and developing plans to help them meet accountability requirements or shut down. Strategies included reopening schools as charter schools or turning them over to the state.

Figure 4 shows the growth of charter schools in Louisiana from 1996 to 2010. Charter schools are private organizations that negotiate a five-year contract overseen by the Louisiana Board of Elementary and Secondary Education. Charter schools must meet state accountability achievement results. They are more attractive than state takeovers because they are seen as empowering local communities and loosening bureaucratic regulations. Under the No Child Left Behind law, charters have proliferated across the United States. In 2005, New Orleans became the first majority charter school city in the United States.

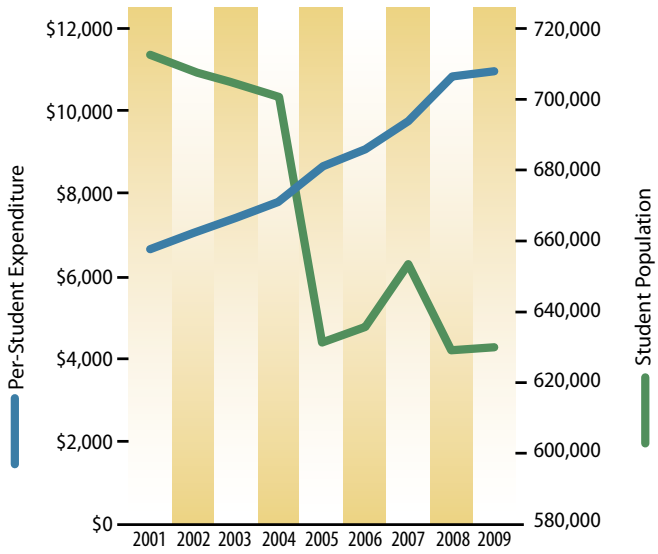

Figure 2. Louisiana per student expenditures since enactment of the No Child Left Behind law. Data from the Louisiana Department of Education annual financial and statistical reports.

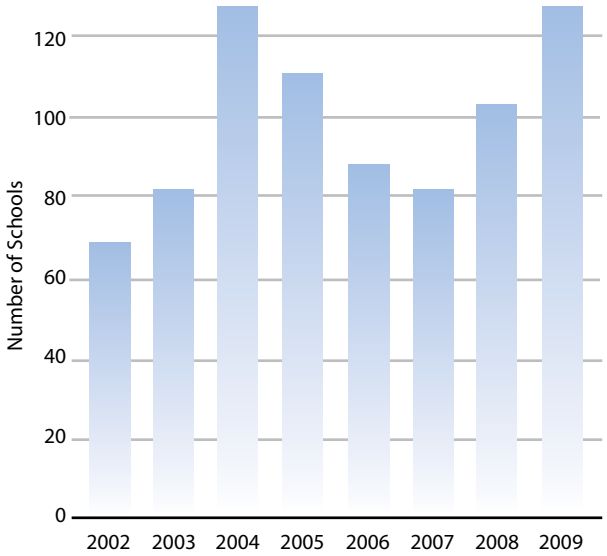

Figure 3. Louisiana schools failing to make annual yearly progress. Data from the Louisiana Department of Education state progress reports.

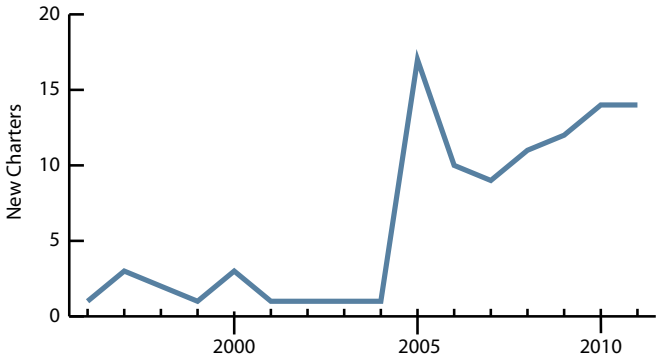

Figure 4. Annual number of new charter schools in Louisiana. Data from the Louisiana Department of Education.

Value-added teacher assessment is a relatively new approach to evaluating teacher effectiveness, replacing principal or peer evaluations.

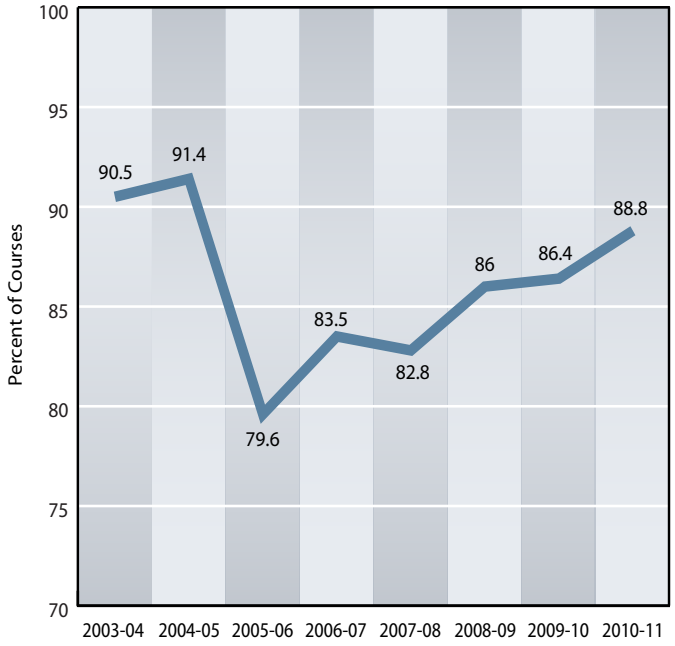

Figure 5: Percent of courses taught by highly qualified teachers in Louisiana.

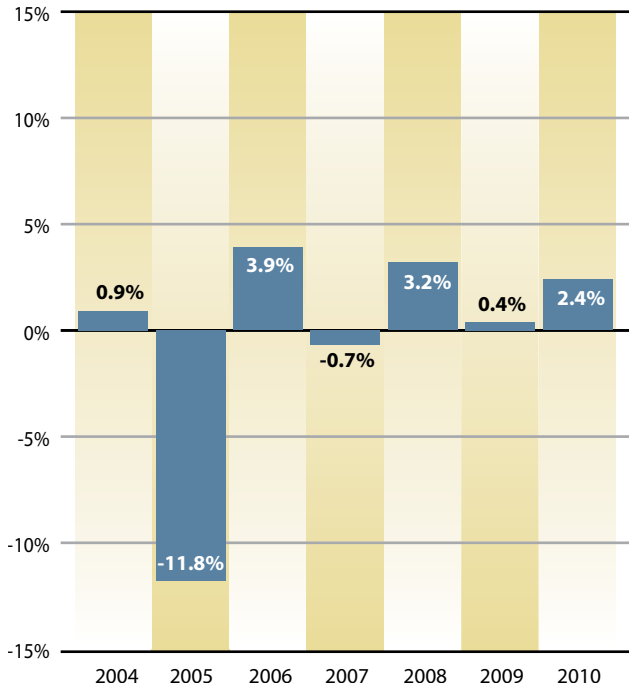

Figure 6. Annual change in percent of courses taught by highly qualified teachers

Teacher Qualifications

In connection with accountability, Louisiana has placed a strong emphasis on teacher qualifications. In the late 1990s, the Louisiana Department of Education developed comprehensive plans to try to improve teacher quality in public schools, with the goal of ensuring that all public school courses were taught by highly qualified teachers. Both new and existing teachers had to meet the new requirements.

By 2004, more than 90 percent of courses were being taught by qualified teachers (Figure 5). This rate dipped significantly after Hurricane Katrina in 2005. By 2011, however, the rate was nearly back to the 2003 level of 90 percent.

Figure 6 further shows the exceptional circumstances of the 2004-05 school year. Schools across the state stretched their resources to accommodate students who evacuated after Hurricane Katrina. The strain was particularly difficult for rural parishes; Claiborne, Jefferson, Vernon, Natchitoches and St. John the Baptist parishes all saw more than 25 percent declines in the percent of courses taught by qualified teachers that year.

Before hurricanes Katrina and Rita in 2005, rural and urban percentages of courses taught by highly qualified teachers were similar (Figure 7). However, rural parishes experienced greater declines in the percent of courses taught by highly qualified teachers after the hurricanes, as well as a slower rate of recovery from 2006-2011.

Market-based approaches to improving education continue to be popular in the United States, including Louisiana. Gov. Bobby Jindal's current education policies include plans to further expand charter schools and vouchers and implement new efforts to improve teacher quality.

Value-Added Teacher Assessment

Gov. Jindal signed into law a value-added teacher assessment for the 2012/2013 school year. Value-added teacher assessment is a relatively new approach to evaluating teacher effectiveness, replacing principal or peer evaluations.

Value-added methods change the incentive structure to hold teachers responsible for the learning of their students. These methods measure each individual student's learning gains in the current year relative to previous years' scores, and the teacher is graded based on the aggregate learning of his or her students.

Proponents argue that value-added teacher assessment is fairer to teachers who teach in disadvantaged schools. It gives teachers strong incentives to teach to all ability levels, and it encourages teachers to give individual students attention as opposed to teaching to the class as a group.

Critics argue that value-added teacher assessment cannot accomplish its objective of distinguishing effective from ineffective teachers. They argue that value-added teacher assessment fails to consider the fact that some schools attract more high ability students with more supportive families and more

positive neighborhood contexts than other schools. Therefore, the system will continue to reward teachers in those schools.

Louisiana's value-added teacher assessment methodology takes into consideration many of the pros and cons. Developed by George Noel, professor of psychology at Louisiana State University, the Louisiana system uses a combination of each student's individual achievement history, along with other key factors, to first predict achievement in the target year and then measure actual achievement against the predicted level, beginning with the fourth grade. It excludes students for whom no prior achievement data is available, as well as those who move during the school year. Teachers are assessed based on the average achievement of all the included students that they taught during the school year.

Louisiana's two major teachers unions, the Louisiana Federation of Teachers and the Louisiana Association of Educators, have criticized the new assessment method, preferring a mentoring program known as the Teacher Advancement Program. This program also claims to add value to education not by using standardized tests in an incentive system for rewarding or punishing teachers based on their students' test performance, but by using student results to help teachers identify areas of strengths and weaknesses, and develop methods for improving the craft of teaching.

Several studies and news stories have documented discontent among teachers about being evaluated solely on the basis of their students' performance on standardized tests. The value-added teacher assessment approach generally exacerbates this problem, but over time the approach could be integrated into mentoring approaches, like the Teacher Advancement Program, and that might make them more palatable to teachers. However, teachers also want more recognition that they do a lot more than "teach to the test." Teachers also help students develop reasoning skills and abilities to cooperate with others, which may have even more long-term benefits to individuals and society than improvement on standardized tests.

The value-added teacher assessment program is representative of market-based attempts to instill more accountability in the nation's public schools. Despite teacher discontent with standardized testing, the trend over the past two decades has been to use test scores to generate more cumulative knowledge of learning outcomes at the student, classroom, school, district and state levels.

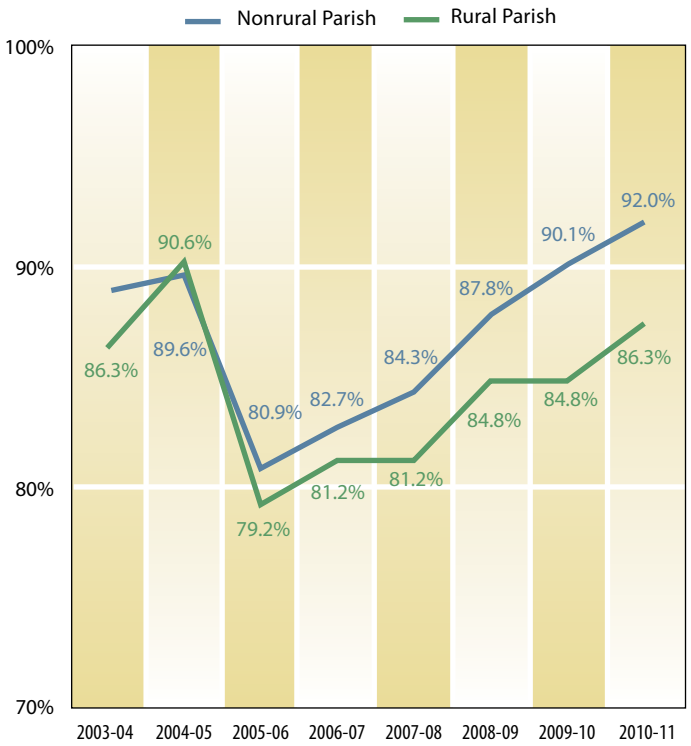

Figure 7. Comparison of percent of courses taught by highly qualified teachers in nonrural and rural parishes.

Mark J. Schafer is an associate professor in the Department of Agricultural Economics and Agribusiness, and Don Asay and Amanda Cowley are graduate students in the Department of Sociology.

Teachers want more recognition that they do a lot more than "teach to the test." Teachers also help students develop reasoning skills and abilities to cooperate with others, which may have even more long-term benefits to individuals and society than improvement on standardized tests.

David Wangila infests corn plants in the greenhouse with newly hatched sugarcane borer larvae. Photo by Yaoyu Bai

Novel pyramided Bt corn is effective for controlling **YieldGard-resistant sugarcane borer**

David S. Wangila, B. Rogers Leonard and Fangneng Huang

Field corn expressing single or multiple *Bacillus thuringiensis* (Bt) traits has been planted in the Midsouth to manage a complex of corn caterpillar pests – including armyworms, earworms and stalk borers – since 1999. Bt corn, a transgenic crop, gets its name because it contains genes from a bacterium, *Bacillus thuringiensis* (Bt), which is a naturally occurring insecticide.

In Louisiana, the most important corn stalk borer causing economic loss to non-Bt corn is the sugarcane borer. Larvae of the first generation corn borers usually attack leaf whorls, causing dead hearts in vegetative stage of plants. In the second generation, they often bore into the corn stalk and develop tunnels within it. Larvae also feed on corn kernels or tunnel into ear cobs.

The development of Bt resistance in target pests is a major threat to the sustainability of Bt corn technologies. Before 2010, corn hybrids (i.e. YieldGard, Herculex1) planted in the Midsouth produced only a single Bt protein targeting caterpillar pests. A regional Bt-resistance-monitoring program coordinated by AgCenter scientists showed that the frequency of resistance to the Bt protein in YieldGard corn increased significantly in Louisiana populations of sugarcane borer in 2009.

To delay Bt resistance, a gene-pyramiding strategy has been employed using transgenic plants that express multiple Bt proteins. The first two commercialized pyramided Bt corn products in the United States are Genuity VT Triple Pro and SmartStax. They were first commercially planted during the 2010 crop season.

LSU AgCenter researchers recently evaluated the efficacy of pyramided Bt corn against a YieldGard-resistant sugarcane borer population. Two greenhouse trials were conducted during 2010-11 to determine larval survivorship and plant injury of YieldGard-susceptible, YieldGard-resistant and heterozygous populations of sugarcane borers on two non-Bt corn and three Bt corn hybrids.

Heterozygous populations have inherited different forms of a particular gene from each parent while homozygous populations have inherited identical forms of a particular gene from each parent. The heterozygous sugarcane borers were developed by crossing Bt-susceptible and Bt-resistant insects.

Three Bt corn hybrids representing different transgenic Bt corn technologies (YieldGard Corn Borer, Genuity VT Triple Pro and Genuity SmartStax) and a non-Bt control corn were included in these trials. YieldGard expresses a single Bt protein; Genuity VT Triple PRO produces two Bt proteins; and Genuity SmartStax corn expresses three Bt proteins for controlling caterpillar pests. Newly hatched larvae of the three corn borer populations were manually placed on plants during reproductive plant stages in the greenhouse. Larval survivorship and tunneling by borers inside each stalk were recorded after 21 days.

Performance of the corn hybrids against sugarcane borer infestation was consistent between the two trials.

On non-Bt corn plants, 45.8-57.5 percent of larvae survived after 21 days (Figure 1). Larval survivorship rates on YieldGard plants were 5.2 percent for the susceptible population, 32 percent for the heterozygous population and 41.1 percent for the resistant population. The Bt-resistant population was highly resistant to YieldGard. Both pyramided Bt corn hybrids were very effective against the sugarcane borer regardless of Bt resistance levels, with a 21-day mortality of greater than 98 percent for the susceptible and heterozygous populations and greater than 96 percent for the YieldGard-resistant population.

Stalk tunnel length by the three populations on the four corn hybrids was highly correlated to larval survivorship. Heterozygous and resistant populations produced significant tunneling inside the plant stalks of non-Bt and YieldGard corn plants, but little injury was observed on the two pyramided Bt corn hybrids (Figure 2).

Pyramided Bt corn lines expressing Genuity VT Triple Pro or SmartStax traits were effective against the YieldGard-resistant sugarcane borers and should offer one tool for Bt resistance management of sugarcane borers. Since 2010, areas planted with single Bt corn such as YieldGard or Herculex in the Midsouth have reduced considerably because of the availability of pyramided Bt corn products. The timely replacement of single Bt technologies with pyramided Bt corn products should delay further increase in Bt resistance frequency in sugarcane borer and ensure the continued success of Bt corn in the state.

David S. Wangila is a former graduate research assistant; B. Rogers Leonard is a professor; and Fangneng Huang is an associate professor in the Department of Entomology. Leonard is also associate vice chancellor in the LSU AgCenter.

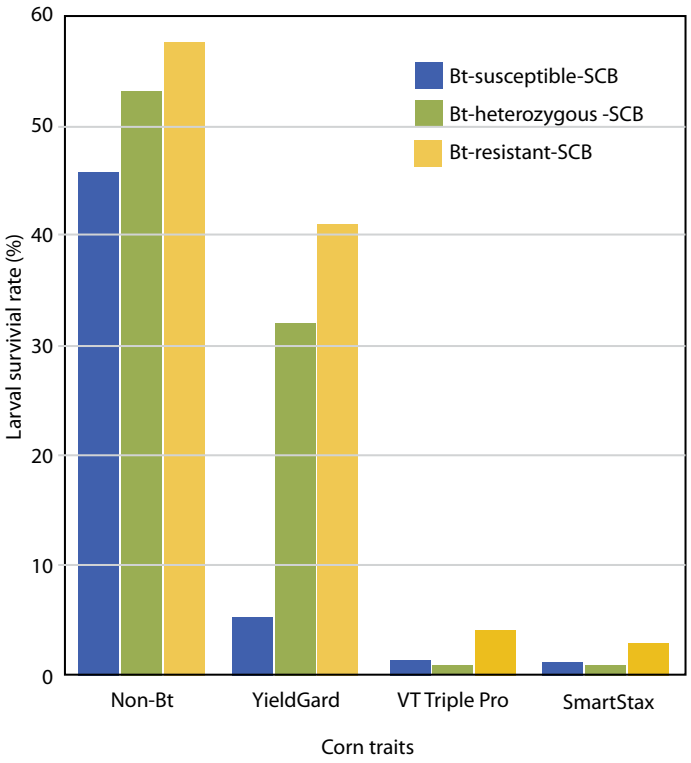

Figure 1. Larval survivorship (%) of YieldGard-susceptible (Bt-susceptible-SCB), YieldGard-resistant (Bt-resistant-SCB) and YieldGard-heterozygous (Bt-heterozygous-SCB) populations of sugarcane borer on four Bt and non-Bt corn hybrids.

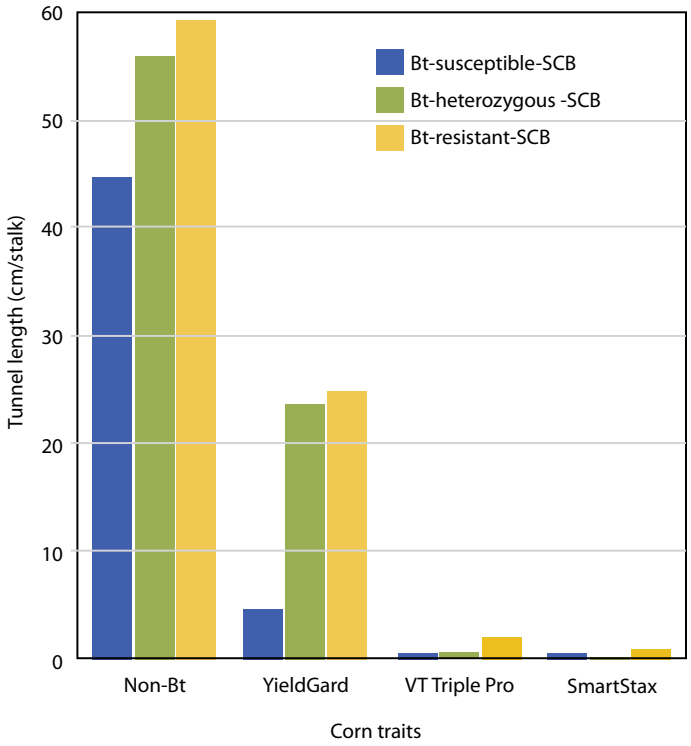

Figure 2. Tunnel length (in cm) from infestations of YieldGard-susceptible (Bt-susceptible-SCB), YieldGard-resistant (Bt-resistant-SCB) and YieldGard-heterozygous (Bt-heterozygous-SCB) populations of sugarcane borer on four Bt and non-Bt corn hybrids.

Keeping the fish submerged and using the water as a transmission medium produces clear images of the ovary. Standard handling and imaging techniques to rapidly view the ovaries of unrestrained, submersed, nonanesthetized channel catfish have been used for the past eight years. Photo by John Wozniak

Ultrasound imaging for use in commercial production of Channel Catfish

Noel Novelo and Terrence Tiersch

Aquaculture is the farming of aquatic animals and plants for local and international commerce. Channel catfish (*Ictalurus punctatus*) is the most important food fish for U.S. aquaculture – especially in Mississippi, Arkansas, Alabama, Texas and Louisiana – where its consumption is part of the local cuisine. Channel catfish farming – which grew out of local resources and the ingenuity of farmers in Southern states and out of research by universities and federal and state agencies – has become the most valuable U.S. aquaculture industry.

Channel catfish aquaculture reached production levels exceeding an average of $450 million dollars per year from 1998 to 2008. It contributed nearly half of the total U.S. aquaculture sales from 2004 to 2006 (Figure 1). Louisiana, one of the top four channel catfish producing states during peak production from 1999 to 2008, generated $109 million in total aquaculture sales in 2007. The catfish industry achieved national prominence as an economic, geographic and cultural symbol of the Southern states in large part because of the natural biological advantages for farming of this fish. These include the straightforward pond spawning methods for providing seed stock (fry and fingerlings for growing), ease of feeding, water quality tolerance and cooking versatility.

These biological advantages provided the basis of the extensive catfish farming and mass production (300 to 700 million pounds per year) in the southern United States (Figure 1). Quantity and sales value fluctuated, with the widest gap between production and sales in 2002. After 2006, catfish production began to decline steadily because of major economic factors such as cheaper imports competing for the well-established U.S. catfish market, national recession, high fuel prices, and high prices for corn, soybeans and other feed ingredients. From 2000 to 2010, farmed water surface for catfish declined from 180,000 to 95,000 acres in the United States and from 14,000 to 1,334 acres in Louisiana. During the same period, the number of catfish operations declined from 895 to 454 in the United States and from 80 to 20 in Louisiana. According to the Ag Summary published by the LSU AgCenter, Louisiana catfish acreage decreased to 609 acres in 2012, with six Louisiana producers selling 1.7 million pounds of catfish valued at $1.8 million.

Economic challenges and declining production meant

that catfish farms had to find new, resourceful ways of cutting costs and improving production efficiency, while maintaining and increasing profit. One effective method for improving desirable production traits in aquaculture, as in other fields of agriculture, is through genetic improvement. In the case of the U.S. catfish industry, one rapid means of generating genetic improvement was to produce hybrid catfish obtained from artificial spawning of the female channel catfish with the male of another species – the blue catfish (*Ictalurus furcatus*). Based on research this hybrid seed stock has demonstrated higher returns for feed invested, higher fillet yields and higher disease resistance than either the channel catfish or blue catfish parent.

Incorporating this hybridization technique into the channel catfish industry required major changes in the method of spawning in hatcheries and presented a suite of new challenges. Most important of the changes in hatchery methods was that female channel catfish and male blue catfish could not be mated in ponds during the natural spawning season.

Additional and more specialized steps in the fry-fingerling production process required:

- Handling thousands of individual broodstock fish, including distinguishing between males and females.
- Selecting females ready for artificial spawning.
- Purchasing of hormones and anesthetics.
- Injecting females to stimulate egg production.
- Checking for readiness to release eggs.
- Manually collecting eggs.
- Obtaining blue catfish males and harvesting sperm.
- Developing commercial-scale procedures for collecting and fertilizing eggs.
- Investing in labor and training for hybrid catfish production.

A fundamental step in hybrid catfish production is egg collection. This requires individually handling thousands of fish during the spawning season to select females to receive a hormone injection, and then identifying those that are ready for collecting mature eggs.

Farmers cull females presumed to have small, undeveloped, immature or degraded eggs. As a result, they discard females with flat bellies and keep only females with external features that indicate readiness for egg collection. Visually assessing females has been used in research and continues to be a method of selecting females. But it is highly subjective, varies from farm to farm and relies heavily on workers whose skill levels vary among hatcheries. Even within natural pond spawning, only 30-50 percent of the females in a pond will produce seed stock. Obtaining highly desired hybrid seed stock, therefore, intensifies the challenge of selecting females with eggs capable of fertilization.

Ultrasonography is commonly used as an assisted reproductive technology in humans and farm animals. Ultrasound imaging uses sound waves and electricity to display images of internal anatomy. The outstanding feature of this technology is that it can provide quick, noninvasive insight into internal biological processes. This technology has the potential to assist catfish farmers in artificial spawning, particularly in selecting female channel catfish for egg collection.

Of the more than 30,000 fish species, ultrasound has been used for reproduction studies in fewer than 30 species. A review of the use of ultrasonography in fish reproduction revealed the need for improving handling and ultrasound imaging to develop standardized methods of evaluating channel catfish females in hatcheries.

To test this technology in channel catfish, initial trials were conducted in 2004 at the AgCenter Aquaculture Research Station during the natural spawning season when the ovaries were large and easily visible. Keeping the fish submerged and using the water as a transmission medium produced clear images of the ovary. Subsequently, standard handling and imaging techniques to rapidly view the ovaries of unrestrained, submersed, unanesthetized channel catfish were developed and have been used for the past eight years.

The instrument used for viewing channel catfish ovaries consists of a laptop ultrasound unit with a linear probe initially designed for veterinary diagnostic imaging of farm livestock. It can be taken to ponds and raceways by using a cart that includes power for the unit, a cooler for holding 10 to 15 gallons of water for positioning the female in an upright swimming position, and baskets and dip nets for moving fish from holding systems. Rapid high-throughput imaging and record-

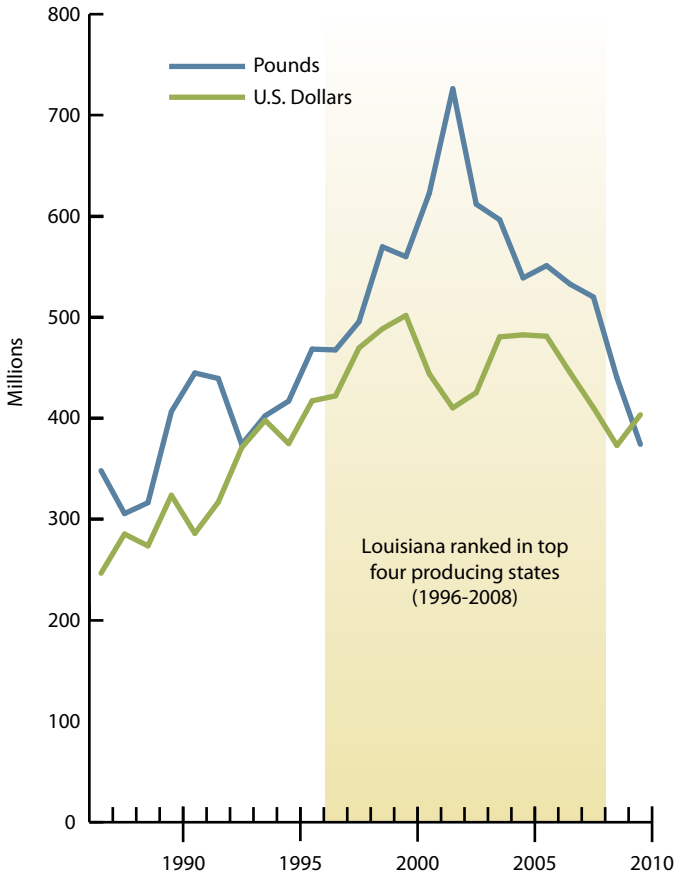

Figure 1. Channel catfish production in quantity (pounds of live weight) and value (sales) in the United States grew steadily from 1988 up to 2000, and remained high until 2006, but began to decline thereafter. Technologies such as ultrasound imaging can be used as reproduction tools to increase efficiency in fry production, reduce unnecessary expenses, and increase profitability in hatchery operations.

ing were accomplished by two operators, with one person positioning the probe and fish and the other person labeling and storing the images. At one seven-hour session a team of two can process 650 catfish with an average imaging duration of 30 seconds for each.

This combination of equipment and procedures meant that the additional handling previously used for fishes – which involved applying ultrasound gel, positioning the fish in a holding apparatus, using anesthesia and exposing the fish to air – were not necessary. Possible injury to valuable fish was avoided with minimized handling, thus providing the full potential of rapid, noninvasive imaging assessment in fish reproduction. This provided unprecedented access and recording of biological data on the internal form, structure and reproductive condition of the ovary. This has practical applications in catfish egg production in genetic improvement efforts such as the channel-blue hybrid catfish.

Although ovarian and egg development is a complicated biological process that can be studied at microscopic levels, real-time imaging of the ovary provides an immediate assessment of reproductive conditions, as well as new biological insights for its use in research and commercial settings.

Presently, the U.S. catfish industry is using hybridization technology for improving production. In commercial hatcheries producing hybrid catfish, ultrasound imaging for assessing ovarian development in channel catfish assists in cutting expenses by culling poor-quality females. This saves on expenses and focuses efforts on the females most likely to give quality eggs. In the future, these same capabilities developed for hybrid production at a commercial scale can be applied for genetic improvement to produce superior channel catfish to avoid the extra effort in production and use of hybrids.

A plastic tip may be used to determine the sex of the catfish before doing an ultrasound. Photo by John Wozniak

Noel Novelo is a doctoral student and Terrence R. Tiersch is a professor at the Aquaculture Research Station, Baton Rouge, La.

LSU AgCenter graduate student Noel Novelo is researching the development of ovaries and oocytes (eggs) in channel catfish by using portable ultrasound imaging. The equipment consists of a laptop and a probe designed for veterinary diagnostic imaging of farm livestock. Photo by John Wozniak

Researchers work to restore whooping cranes in Louisiana

Bruce Schultz

LSU AgCenter wildlife researchers Tandi Perkins, at left, and Vladimir Dinets make notes on their observations of young whooping cranes. Perkins and Dinets use a blind to watch each bird for five minutes, and the birds' activities and movements are recorded in a logbook.

Until the early 1900s, whooping cranes were a fairly common sight in southwestern Louisiana.

"At one time, Louisiana had more whooping cranes than anywhere in North America," said Sammy King, of the U.S. Geological Survey Louisiana Cooperative Fish and Wildlife Research Unit at the LSU AgCenter.

Edward McIlhenny, an ornithologist and businessman from the family that started the Tabasco Co., in his 1943 book "Bird Life of Southern Louisiana," wrote about the disappearance of several species of birds in the coastal region, including the whoopers.

McIlhenny wrote, "Before the settling of the prairies bordering the coast of Louisiana and while these prairies were used only as cattle ranges, the whooping crane (locally known as grue blanche) was one of our most picturesque winter residents. Quite large flocks of them were in evidence all winter to anyone riding over the open ranges. Due to their natural shyness, they were not often killed, except by hunters who stalked them by walking alongside a horse or steer. As the flesh of the whooping crane was highly prized for food, its large size caused it to be killed in preference to ducks or the smaller geese. The whooping crane now is practically extinct in Louisiana and occurs only as a straggler."

Now, more than 60 years later, a project monitored by LSU AgCenter researchers aims to restore a population of the big birds in the Louisiana coastal region.

The LSU AgCenter has contracted with the Louisiana Department of Wildlife and Fisheries to conduct the research for the project. "They are providing us with support funding for the monitoring," King said. "It's a very close-knit team."

The project is funded with a combination of public and private grants, including one from the International Crane Foundation. Another partner in the project is the U.S. Fish and Wildlife Service.

"We hope it will continue until we can get breeding pairs to have a self-sustaining population," King said. "The project will be evaluated after three years and will likely continue for at least 15 years."

As late as the early 1900s, a migratory flock wintered every year in Louisiana, and a resident flock stayed in the White Lake area in Vermilion Parish, King said.

In the early 1900s, the populations fell dramatically as the huge birds, which can stand 5 feet tall with 8-foot wingspans, were easy targets for shooters. At the same time, whooping cranes and their eggs were being collected for museums, and the breeding wetlands in the Midwest were rapidly being drained.

A major hurricane led to the end of the resident Louisiana flock, King said. The last bird at White Lake was captured in 1950 and brought to Aransas Pass, Texas, the wintering area for the last surviving flock in North America.

"At one time, they were down to 14 birds at Aransas," King said.

Since 2010, three groups of young birds have been relocated at White Lake Wetland Conservation Area, a state-owned reserve managed by the state Department of Wildlife and Fisheries.

On page 17: A lone whooping crane flies among herons and ibises over a rice field in Vermilion Parish. The bird was one of 40 juvenile birds brought to White Lake to re-establish a resident flock.

Upper left inset photo: Vladimir Dinets, LSU AgCenter wildlife researcher, holds up an electronic tracking device antenna to determine the location of whooping cranes at White Lake. Tandi Perkins, another LSU AgCenter wildlife researcher, inside an observation blind, completes notes made on the birds' activities at a compound where the birds are fed when they are brought from a nursery in Maryland.

Lower right inset photo: A group of four juvenile whooping cranes huddle closely in the marsh at the White Lake compound.

In November 2012, 14 new birds were brought to the compound at White Lake. Like the two previous groups, they were raised at the U.S. Geological Survey Patuxent Research Facility in Maryland until they were six months old.

When they were moved to Louisiana, they were placed in a release pen in the marsh at White Lake, where they were allowed to become acclimated to the Louisiana environment for several weeks. The birds were protected from predators by an electric fence around the pen.

To prevent the young birds from becoming imprinted to humans, the birds' caretakers wore white suits and masks to imitate adult cranes.

"The entire time they are at the pen, they do not see a human out of costume," said Tandi Perkins, AgCenter wildlife researcher.

Their diet consisted of chicken feed, which was stopped in January. It's usually at that point that the birds start venturing away from the compound, Perkins said.

While the birds were in the pen, Perkins and the other workers wore white suits with masks to prevent the birds from becoming accustomed to the sight of humans.

Perkins, along with AgCenter researcher Vladimir Dinets and Department of Wildlife and Fisheries colleague Sara Zimorski, uses an enclosed blind to observe the birds and takes copious notes of their movements and activities.

Transmitters are placed on the birds' legs to track their movements. "We know exactly where all of our birds are because of satellite data," Perkins said.

Some birds have flown away, never to be seen again either because of mortality or transmitter failure. Some have gone to Texas, and others have ventured to Arkansas, but later returned. "Last year, we had birds at White Lake until July," Perkins said.

Before the new birds arrived, there were 14 whooping cranes in Louisiana from two previous groups. Of the first 10 birds brought to White Lake in February 2011, only two are still alive. A dozen of the 16 birds from the second cohort brought in November 2011 have survived.

Of the birds that didn't survive, some were taken by predators. Two were shot in October 2011 by two juveniles in a pickup truck.

Seven of the veteran birds have been staying at a location near Bunkie since July, Perkins said, and they apparently were comfortable enough during hunting season to remain there.

A young whooping crane, wearing identification bands on its legs, runs over the marsh at White Lake.

Tandi Perkins, LSU AgCenter researcher, peers through binoculars at a group of whooping cranes at White Lake in Vermilion Parish where the birds were once commonly found.

Perkins regularly monitors the birds' whereabouts, and several days each month, she goes into the field to locate them and observe their behavior.

Each bird is observed for five minutes. Anything the subject does – peck at the ground, look up at a passing bird or fly away – that action is data to be recorded.

Perkins and her fellow researchers on the project want to know if there is a higher survival rate among birds that appear alert, wary and more skittish. She is excited that this study could be the first of its kind.

"It's an open field to understand the biology and the ecology of the birds, their behavior and where they go."

Perkins said the birds often stay in rice and crawfish fields, and farmers have been cooperative and eager to learn about the project.

"They have just been super to work with," she said. "They have been very supportive and accommodating."

Rice and soybean farmer Christian Richard said three of the birds stayed on his farm for about three months. They didn't interfere with his rice farm operations, he said, although they attracted flocks of birdwatchers.

"They were really big, big birds. It was neat to see them," Richard recalled. "Then one day they just took off."

Perkins said the birds have not been classified as endangered, which would affect how property owners manage their land where the birds are found.

Efforts are also under way to establish a migratory flock that nests in Wisconsin and spends the winters in Florida, using an ultralight aircraft to teach them the route.

An attempt to establish a resident flock in Florida failed because of a severe drought and heavy predation from bobcats. King said the Florida habitat was not as good as the White Lake area. In addition, nearby rice and crawfish fields are ideal for the birds.

"There are few places in the world that can compare to Louisiana's rice fields in terms of water bird diversity, particularly being so easily viewable," King said.

Bruce Schultz is a writer and photographer in Communications.

Retailers participating in the Louisiana Super Plants program display signs calling attention to the recommended plants. Photo by Regina P. Bracy

Louisiana Super Plants
A Marketing Tool That Works

Regina P. Bracy, Allen D. Owings and Dan Gill

The Louisiana Super Plants program was started in 2009 to identify and promote exceptional plants that perform well in Louisiana. Louisiana's summer heat and humidity are tough on plants, and most plants recommended for other parts of the United States will not always perform well here.

The LSU AgCenter and Louisiana's nursery and landscape industry, through the Louisiana Nursery and Landscape Association, identified the need for a state-based program that uses university research to identify and promote exceptional plants for Louisiana landscapes. Funding for this project was provided through the Louisiana Department of Agriculture and Forestry with U.S. Department of Agriculture Specialty Crop Block Grant Program funds.

The Louisiana Super Plants program has three parts. The first identifies outstanding plants. The second makes sure the plants are available at retail nurseries and garden centers. The third promotes the plants to Louisiana gardeners.

Each Super Plant must have at least two years of rigorous evaluations and have a proven track record under north and south Louisiana growing conditions. Louisiana Super Plants must prove hardy across the state. Louisiana Super Plants must be easily produced and available for all nursery and landscape industry wholesalers and retailers to market and sell.

Louisiana Super Plants are selected two years in advance of release. The Louisiana Super Plants selection committee composed of LSU AgCenter personnel selects plants based upon observations made in replicated plots and demonstration trials across the state.

The Louisiana Super Plants advisory committee, which is composed of nursery and landscape industry personnel from across the state, meets with the plant selection committee for

further scrutiny of the plant's landscape ability and marketability. This selection process gives each Super Plant the combined rating of university-tested and industry-approved.

To ensure that Louisiana Super Plant selections are available at retail nurseries and garden centers, the Louisiana Super Plants selection committee works closely with Louisiana wholesale growers so they produce plenty of the selected plants. At the same time, retail sellers are kept informed of the selections and are encouraged to carry them in their garden centers and nurseries. In addition, display signs containing plant photos and growing information are provided to nurseries and garden centers to help customers find and choose Louisiana Super Plants.

The first Louisiana Super Plants were promoted in the fall of 2010. To date, 22 plants have been identified as Louisiana Super Plants, and more than 200 retail and grower operations have signed up to participate in the program.

Surveys of participants were conducted to determine the impact the Louisiana Super Plants program had on sales. In the first season (fall 2010) of Louisiana Super Plants, one wholesale grower reported a 145 percent increase in sales of Amazon dianthus over the previous year. A retail garden center had a 1,920 percent increase in Camelot foxglove sales. Sales of the woody ornamental Shishi Gashira camellia were up by 45 percent at one wholesale grower.

A larger survey was conducted during the summer of 2012

Warm-season bedding plants

Alternanthera Little Ruby

Angelonia – Serena series

Pentas – Butterfly series

Begonia – BabyWing series

Lantana – Bandana series

Cleome Senorita Rosalita

after four marketing seasons. Retail and wholesale businesses participating in the Louisiana Super Plants program were contacted by email, and 15 percent responded. Of the participants who responded, 40 percent described their business as retail, 40 percent as wholesale, none as landscape design, and 20 percent as landscape installation and maintenance. Eighty percent of the respondents said the program had a positive effect on their business. Fifty percent of the respondents said sales or use of Super Plants in their business increased from 21 percent to 40 percent after the promotion began; the other 50 percent indicated increased sales of 20 percent or less.

The survey indicated that not only did the program increase sales of Louisiana Super Plants, but overall sales at a business also increased. More than 60 percent said the Super Plants program increased traffic flow or interest in their business. All the respondents indicated that the program increased overall sales in their business from 10 percent to 60 percent. Eighty-five percent of the respondents said the Louisiana Super Plants program had been beneficial to the nursery and landscape industry.

When asked to name the Super Plant that had the greatest impact on sales, one respondent wrote "no one plant, but an increase in general plant knowledge and interest."

The Louisiana Super Plants program is proving to be a marketing plan that works.

Regina P. Bracy is a professor and the research coordinator at the Hammond Research Station. Allen D. Owings is a professor at the station. Dan Gill is an extension horticulturist.

Cool-season bedding plants

Viola – Sorbet series

Delphinium Diamonds Blue

Kale Redbor

Shrubs

Camellia Shishi Gashira

Vitex Shoal Creek

Rose – Drift series

LOUISIANA SUPER PLANTS

WARM-SEASON BEDDING PLANTS
Alternanthera Little Ruby
Angelonia – Serena series
Begonia – BabyWing series
Cleome Senorita Rosalita
*Lantana – Bandana series
Pentas – Butterfly series

COOL-SEASON BEDDING PLANTS
Columbine – Swan series
*Delphinium Diamonds Blue
Dianthus – Amazon series
Foxglove – Camelot series
Kale Redbor
Viola – Sorbet series

SHRUBS
*Althea Aphrodite
Camellia Shishi Gashira
Azalea Conversation Piece
Gardenia Frostproof
Hydrangea Penny Mac
*Rose – Drift series
Rose Belinda's Dream
Vitex Shoal Creek

TREES
Evergreen sweetbay magnolia
Southern sugar maple
*Willow oak
*New for 2013

Shrubs


Gardenia Frostproof


Hydrangea Penny Mac

Trees


Evergreen sweetbay magnolia


Willow oak


Southern sugar maple

Garden Expansion at the Hammond Research Station

Allen D. Owings, Regina P. Bracy and Yan Chen

Since the debut of a landscape horticulture research and extension program at the Hammond Research Station in 2006, gardens supporting this new mission continue to expand.

The station's oldest plant collection is in the Hody Wilson Camellia Garden. This garden is part of the American Camellia Society's Camellia Trail Gardens and includes more than 200 varieties not found in any other public garden in the United States. The Tangipahoa Parish Master Gardener Association hosts about 400 home gardeners each February at the annual camellia garden open house.

The major garden planted at the station since the mission change is the Margie Jenkins Azalea Garden. This garden, which was established in 2007, provides valuable information on horticultural characteristics of its 70 shrub and tree species. The garden is named for Margie Y. Jenkins, owner of Jenkins Farm and Nursery in Amite, and recognizes the enormous contribution she has made in promoting azaleas and native plants to the nursery industry.

Phenology is the study of recurring biological phenomena, such as plant budding, influenced by climate. The phenology garden at the station helps horticulturists study plant growth timing, which can indicate when insect pressure will be greatest. The phenological events of flowering ornamentals are recorded and used to predict insect pest activities. This information is used to develop a biological calendar for a more effective way to control pests in the landscape with less use of pesticides.

A shade garden is where new plants and new varieties of older plants are evaluated under shade provided by a stand of spruce pine, loblolly pine and oak trees. Plants in the shade garden include hosta, caladium, torenia, begonia, coleus and New Guinea impatiens.

Although the sun garden is not new, it has expanded over the past three years from 10 to 48 raised beds. These beds, with built-in irrigation, average about 500-750 square feet. They are used for demonstration and replicated research involving landscape evaluation of cool-season annual flowers, warm-season annual flowers, herbaceous perennials, seasonal tropicals, roses, companion trees and shrubs, and ornamental grasses. More than 850 varieites of ornamental plants are evaluated each year, and plants are added and removed from the sun garden monthly as new studies begin and older studies conclude.

A new garden addition is being called the Piney Woods Garden. This garden includes five acres with almost 40 individual landscape beds. The garden features native trees, selections of clonally propagated cypress from China, Southern heritage shrubs (such as camellias), native azaleas, a collection of yellow flowering magnolias, Japanese maples, Huang azaleas, new shade tree selections and more. Specific plants already established in this garden include some of the newest hydrangeas from the U.S. Department of Agriculture-Agricultural Research Service, a camellia collection from the Southern Living Plant Program, and the Southgate series of heat-tolerant rhododendrons developed by plant breeder John Thornton of Franklinton, La. Funding for the garden was provided by the Louisiana Nursery and Landscape Association.

The area for long-term observational studies of field plantings is being expanded. This area will include landscape shrub response to plant growth regulator applications, a variety evaluation of the numerous new dark purple/black foliaged crape myrtle varieties, crape myrtle hedging studies, a hardy hibiscus trial, evaluation of bald cypress with winter foliage retention capabilities, and evaluations of two new selections of the Japanese crape myrtle.

Many visitors – including Master Gardeners, garden club members, retail garden center employees and professional landscapers – make regular trips to the research gardens at the Hammond Research Station. For more information go to www.LSUAgCenter.com/hammond.

Allen D. Owings and Regina P. Bracy are both professors at the Hammond Research Station. Yan Chen is an assistant professor there. Bracy is also the research coordinator.

Tube heater evaluations
at the Hill Farm poultry demonstration houses

William E. Owens and Corinne Ray

The poultry industry generates $1.6 billion per year for the Louisiana economy and is the largest animal commodity in the state. The majority of the industry in Louisiana is located in the north central parishes of Bienville, Claiborne, Jackson, Lincoln, Ouachita, Union, Webster and Winn. Other major poultry producing parishes include Natchitoches, Sabine and Vernon.

The Hill Farm Research Station in Claiborne Parish is ideally located to provide the poultry industry with information about management practices, equipment alternatives and innovations that can improve poultry producers' profitability. Through a cooperative agreement with poultry industry leaders, LSU AgCenter poultry researchers, poultry producers, members of the Louisiana Farm Bureau, and the Louisiana Department of Agriculture and Forestry, demonstration poultry houses were constructed at the Hill Farm beginning in 2005. Members of these organizations formed a poultry house steering committee to recommend demonstrations to be conducted in these houses. A variety of donors provided funding for the houses, and the poultry industry provided the equipment.

The poultry houses at the Hill Farm are designed to provide the poultry growers of Louisiana evaluations of the latest innovations in equipment and management techniques for raising broilers under commercial conditions.

The two buildings are solid-wall houses measuring 42 feet by 500 feet. They are equipped with tunnel-type ventilation and have 6-foot-by-85-foot cool cells, which are used for additional cooling from moisture being drawn into the house by fans. The computer control center allows state-of-the-art management and control of house conditions, such as air flow, humidity and temperature.

Evaluation of Tube Heaters

The initial demonstration conducted in the houses compared tube-type heaters with traditional brooder-type heaters.

Brooder heaters consist of burners below canopies that direct heat downward toward chickens below.

Tube heat is relatively new to the poultry industry. Tube heaters are propane or natural gas-fired heaters that are hung near the ceiling of the chicken house. These heaters consist of a firebox connected to a metal tube, usually 40 to 50 feet long, running lengthwise in the house. The research program evaluated their effectiveness and identified possible fuel savings.

This study compared propane use and bird performance between the two houses for two years, during which eight flocks of broilers were produced. Bird performance was measured by livability, weight gain and feed conversion – the ratio of feed consumed to weight gained. All parameters were the same for the two houses except for the type of heater. House of Raeford contracted with Hill Farm to provide birds for the houses, and flocks were raised under commercial conditions to approximate typical grower use of equipment.

The two poultry houses at the Hill Farm Research Station in Homer are solid-wall houses and measure 42 feet by 500 feet. The houses are equipped with tunnel type ventilation and have 6-foot-by-85-foot cool cells. Photos by William E. Owens

The brooder-heated house included 18 brooder units.

Seven tube heaters were used in the tube-heated house.

Seven tube heaters were installed in one house, and 18 brooder heaters were used in the other. Propane use was measured by separate meters for each house.

Results

Comparisons of propane use and bird production values are shown in Table 1. Tube heaters used an average of 9.86 percent less propane than conventional brooder heaters over the two-year comparison. Bird performance measured by livability, average weight and feed conversion was the same for both houses. Over the two-year study, the house with tube heaters used 630 gallons less propane for a savings of approximately $1,280 with propane at $2.03 per gallon.

The initial cost of tube heaters is higher than brooder heaters. Using commercial prices, tube heaters cost approximately $3,600 more per house. Using the information from this two-year comparison, it would take four to five years to recoup the additional cost. However, this estimate depends on weather (more propane is used in cold years) and propane cost.

Conclusions

Tube heaters were more economical to use but more expensive initially. The higher initial cost can be recouped by the savings in propane use. Savings will be more pronounced in colder years and in more northern locations. No differences were noted in maintenance cost. Both sets of heaters were new at the beginning of the study, and no mechanical issues were noted for either type in the two years of use.

New Study Planned

With the completion of the heater comparison, the steering committee has decided to evaluate a new proprietary bedding product. The product is a pelletized blend of recycled newsprint and recycled corrugated cardboard treated before pelletizing with a proprietary chemical. When applied to cellulose, the chemical is purported to allow cellulose fibers to absorb urea and phosphorus up to 50 percent or more of their initial weight.

The study has three objectives. One is to compare the effect of a proprietary cellulose bedding product with conventional wood shavings in two broiler houses on moisture, ammonia, phosphate and nitrogen levels and on bird performance and footpad health. The second objective is to compare the two types of bedding for bacterial pathogens present, including *Salmonella* species, *Enterococcus* species, *Escherichia coli* and *Campylobacter* species. The final objective is to compare darkling beetle adult and larvae numbers in the two types of bedding.

William E. Owens is a professor and Corinne Ray is a research associate at the Hill Farm Research Station in Homer. Owens is also the research coordinator at the station.

Table 1. Comparison of tube heat and brooder heat at the Hill Farm demonstration houses.

House	# of birds placed*	# of birds sold*	% Livability*	Weight*	Feed conversion*	Propane use (gal)**	Value of propane @ $2.03/gal**
Tube heaters	22,043	21,074	95.60	8.73	2.05	5,768.20	$ 11,709.45
Brooder heaters	22,043	21,108	95.76	8.75	2.04	6,398.88	$ 12,989.73

*Average from eight flocks (2 years)
** Total from eight flocks (2 years)

Costs of producing energy cane as a biofuel feedstock in Louisiana

Michael E. Salassi, Kayla L. Brown, Michael A. Deliberto and Kenneth A. Gravois

Renewable energy research and development are expanding in size and scope across the United States as the focus has shifted from the relatively simple process of producing ethanol from grain to producing a variety of biofuels through advanced cellulosic processes. The Renewable Fuels Standard, passed by Congress as part of the Energy Independence and Security Act of 2007, establishes biofuel production target levels for the coming years, and much of the growth in production is projected to be in cellulosic biofuel.

Cellulosic biofuel is produced from lignocellulose, a structural material that comprises much of the mass of plants. The advantage of this type of biofuel production is that a wide variety of plants can be used as feedstocks. Much of the production and economic research being conducted in this area is seeking to identify crops that can produce high levels of plant material per acre at an economically feasible production cost to be used as a viable feedstock for biofuel production.

Louisiana has the potential to play a major role in the development and production of cellulosic biofuel. One of the leading crops being considered as a feedstock is energy cane. Energy cane is similar to sugarcane – but with major differences. Energy cane has a lower sucrose content and higher fiber content than sugarcane varieties grown in the state, and most importantly, it has higher expected yields in terms of tons of plant material per acre.

Initial results from research conducted by the LSU AgCenter show the potential for energy cane production in Louisiana, expected crop yields and projected variable production costs.

Renewable energy

Renewable energy sources can be defined as those sources of energy that are naturally replenishing and flow-limited. This means that renewable energy sources are virtually inexhaustible over a long time period but are limited in the amount of energy available at any one time. Sources of renew-

A sugarcane harvester cuts energy cane during a a field day at the U.S. Department of Agriculture-Agricultural Research Service Sugarcane Research Unit field near Schreiver, La., on Oct. 2, 2012. The field day, co-sponsored by the LSU AgCenter, was part of an outreach program conducted by the AgCenter's Louisiana Institute for Biofuels and Bioprocessing as part of a $17 million grant from the USDA. Photo by Rick Bogren

able energy that have been used for decades include solar, hydroelectric, geothermal and wind. In 2011, renewable energy accounted for approximately 12 percent of total U.S. domestic energy production.

Bioenergy technologies use renewable biomass feedstocks to produce an array of energy-related products, including electricity; liquid, solid and gaseous fuels; heat; chemicals, and other materials. Bioenergy is the leading source of renewable U.S. energy production and accounts for 48 percent of total renewable energy production and 5 percent of total U.S. energy production. The term "biomass" generally refers to any organic, non-fossil material of biological origin constituting a renewable energy source, including dedicated energy crops, other agricultural crops, agricultural crop wastes and residues, wood wastes and residues, aquatic plants, animal wastes, and municipal and other wastes.

Energy cane yields

The LSU AgCenter has recently begun evaluating varieties of energy cane as part of several research projects to identify the feasibility of using energy cane as a biofuel feedstock. Production research is evaluating the yield potential (tons of plant material per acre) and stubbling ability (years of harvest) of energy cane. Economic research is evaluating the projected cost to a grower of producing energy cane.

Yield estimates of energy cane varieties for the first three years of harvest (plant cane, first stubble and second stubble) conducted by the LSU AgCenter at the Sugar Research Station in St. Gabriel from 2009 to 2011 are shown in Figure 1. These energy cane varieties were developed by the U.S. Department of Agriculture-Agricultural Research Service Sugarcane Research Unit in Houma, La., and are being evaluated by the AgCenter as part of a multistate Sun Grant Project. Plant cane yields ranged from 25.5 to 44.2 tons per acre at a field harvest weight (wet tons). First-stubble yields were similar, ranging from 24.4 to 47.0 tons per acre. Second-stubble yields, however, were higher, ranging from 50.7 to 72.4 tons per acre.

Because energy cane varieties are known to have longer stubbling ability than traditional sugarcane varieties, energy cane yields are expected to increase over time to some maximum level and then decline for a period of years. Current research continues to evaluate the yield potential and stubbling longevity of alternative energy cane varieties.

Energy cane production costs

To estimate the cost of using energy cane as a biofuel feedstock, yields beyond second stubble were projected under alternative stubbling assumptions. Production costs were estimated for the various planting, cultivation and harvest operations required, and then feedstock costs were estimated on a dry ton basis. Cellulosic processes produce biofuel by first drying feedstock to low moisture levels and then using a chemical process to convert the dry biomass to biofuels.

Energy cane yields through second stubble were used to project yields through fourth-, fifth- and sixth-stubble crops based on a yield-decline pattern similar to sugarcane but applied later in the crop cycle. Fiber content from energy cane trials, ranging from 17.8 to 28.7 percent, was used to convert yields to dry-matter content. An approximation of dry matter content (dry matter yield) can be obtained by multiplying the weight of field harvest yields by the percent dry matter content. Variable production costs per dry ton of plant material, excluding charges for land and equipment, were estimated to be in the range of $52 to $67 per dry ton and are shown in Figure 2. These production cost estimates, with additional charges for land and equipment, will form the basis of future biofuel feedstock prices paid to crop producers.

Other research projects in the AgCenter are focusing on reducing the conversion rates of dry matter feedstock to units of alternative biofuels. The production of advanced biofuels from agricultural crops offers tremendous potential for Louisiana, both in the agricultural production sector as well as the biofuel energy production sector.

Michael E. Salassi is the Fairbanks Endowed Professor, Kayla L. Brown is a graduate research assistant, and Michael A. Deliberto is a research associate in the Department of Agricultural Economics & Agribusiness. Kenneth A. Gravois is the Graugnard Professor at the Sugar Research Station, St. Gabriel.

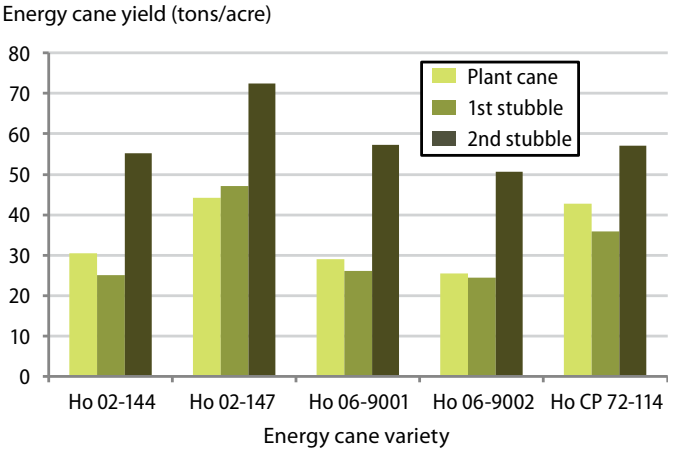

Figure 1. Energy cane yields through second stubble in wet tons per acre.

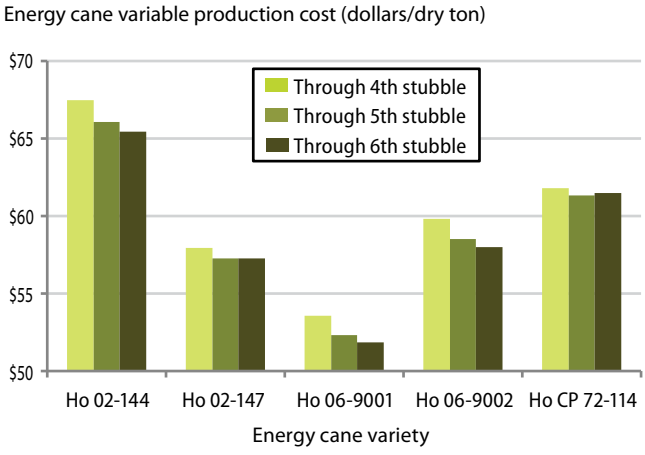

Figure 2. Estimated energy cane variable production costs per dry ton.

Ornamental attributes of some plant viruses

Rodrigo A. Valverde

Plant viruses are biological entities made of RNA or DNA. They are disseminated by way of vectors, usually insects, although in many cases they are transmitted through seed, cuttings from infected plants or mechanical contact. In general, plant viruses have been studied because they cause disease and economic loss in crops. The most common symptoms that result from virus infections include foliar mosaic, yellow vein, leaf malformation and plant stunting.

In many cases, ornamental plants with variegated colors in their leaves, such as white or yellow, have been propagated and commercialized as distinct varieties. This practice has been conducted also with flowers exhibiting desirable aesthetic value in which the petals are variegated because of the irregular distribution of pigments. Most foliar or flower variegations are the product of genetic factors that affect the production of pigments that give the colors to leaves and flowers. Examples of this are the variegated flowers of Red and Yellow tulip and the variegated leaves of Shell ginger. However, some plant viruses can cause these conditions in plants, and these viruses have been used by ornamental horticulturists to enhance the commercial value of plants.

Tulip breaking virus in tulips is a classic example of a virus used to increase the beauty of a flower. Tulips with beautifully variegated flowers are referred to as Rembrandt tulips because they were a favorite subject in many paintings by the Dutch Masters. In the past, tulips producing variegated flowers were desired and often sold at high prices, especially during the early 17th century. At that time, the virus was deliberately transmitted to healthy plants by some growers, particularly in Holland. Today, tulips with the same variegation patterns are widely available. Although often sold as Rembrandt tulips, most of them are actually virus-free, and the variegation is the product of genetic factors and not a virus.

In the 1940s, LSU AgCenter researchers showed that a virus named Camellia yellow mottle virus was the cause of the attractive color variation of some camellia varieties commonly grown in Louisiana. Today, we know that this virus does not appear to significantly affect the vigor or flowering of camellias. Nevertheless, as in the case of variegated tulips, the flower variegation of some camellia varieties is of genetic origin, while in others it is the result of viral infections.

In Louisiana, during the past few years, there has been an increase in the number of landscape ornamental plants showing a variety of attractive exotic foliar variegations. Laboratory testing at the LSU AgCenter revealed that for some of them, viral infections were the cause of the variegation and not genetic factors. Some of these ornamental plants include cannas, which are popular landscape plants grown worldwide. Varieties such as Bengal Tiger and Pretoria show attractive yellow stripes on their foliage, which has been associated with Canna yellow mottle virus.

Nandina, also called heavenly bamboo, is one of the most common ornamental plants in Louisiana landscapes. Plants infected with Nandina stem pitting virus show leaf curling, reddening and stunting, which can be desired characteristics. The virus does not have any known vector, and the only identified host is nandina.

Flowering maple infected with abutilon mosaic virus has been commercialized throughout the world since the late

Red and Yellow tulip

Variegated camellia

Firepower nandina

Dancing Flames salvia

1800s. The virus has negligible effects on plant growth, vigor and flowering. Several plant viruses have been associated with Golden Ginger mint, an attractive mint variety exhibiting yellow veins on green leaves.

Recently, LSU AgCenter scientists discovered that the attractive yellow variegation of Dancing Flame salvia leaves is caused by a plant virus.

All the virus-infected plants described are available through nursery catalogs and at garden centers across the United States. They are considered safe because they are already widely established. The viruses have very narrow host ranges and have lost the ability to be transmitted by vectors but can be transmitted by grafting in species normally propagated vegetatively.

It is important to have in mind that some of these viruses may cause disease in crops. Therefore, it is recommended that in-depth studies on the biological properties of these viruses be conducted before commercializing their use.

Rodrigo A. Valverde is a professor in the Department of Plant Pathology.

Bengal Tiger canna leaves have yellow stripes.

Crocodile geranium

Emerald Gold mint

Shell ginger

These examples of viral infections of some ornamental plants illustrate, at least from the commercial point of view, the desirable effect that some viruses can have.

LSU AgCenter loses two faculty members in 2012

Rick Bogren

Don Ferrin at right

The LSU AgCenter lost two members of its faculty in 2012 with the untimely deaths of Ron Sheffield and Don Ferrin.

Sheffield, a water specialist in the Department of Biological and Agricultural Engineering, died on Nov. 24, and Ferrin, plant pathology extension specialist in the Department of Plant Pathology and Crop Physiology, died on Dec. 25.

Sheffield received his bachelor's degree from Unity College, Unity, Maine; his master's degree from Virginia Tech; and his doctorate from North Carolina State University.

Ron Sheffield

He joined the AgCenter in 2008, following stints with the University of Idaho and North Carolina State University.

Sheffield's expertise included irrigation, water quality and water management, along with animal waste air quality.

"He was vibrant, robust, and never complained," said Bill Branch, who had been the state water specialist before retiring in 2008. Sheffield replaced Branch, but Branch returned to the AgCenter part-time to help out as Sheffield battled illness.

"Ron had a marvelous speaking voice," Branch said. "He could carry a room without a microphone."

Sheffield spoke frequently to many audiences and conducted two-day sessions for irrigation contractors so they could prepare for for the state exam, Branch said.

He developed significant working relationships with counterparts in other universities, including Texas A&M University, New Mexico State University, Arkansas State University, Mississippi State University and North Carolina State.

"He had high energy and was very honest," said Steve Hall, associate professor in the Department of Biological and Agricultural Engineering. "He wanted to get the facts right."

Sheffield used his position in the department to teach and advise students, Hall said.

"He wanted students to be thinkers – to ask themselves, 'What does this really mean?'" Hall said. "He always wanted to make things practical. He helped students understand practical applications of engineering."

Hall called Sheffield "a very good teacher in nontraditional environments." He worked with the senior design program at the undergraduate level, offering a unique perspective.

"Ron's role was critical in issues of water quality, fresh water and saltwater intrusion. He was an extremely talented and skilled specialist and innovative in areas of water resources," said Paul Coreil, former vice chancellor and extension director.

Born in Rochester, Minn., in 1951, Ferrin received his bachelor's and master's degrees from Michigan State University and his doctorate in plant pathology from the University of Florida.

Ferrin joined the AgCenter in 2005, after having worked 10 years for a private laboratory in California. Earlier he had worked for a flower and ornamental plant producer in Florida before earning his doctorate. After a one-year post-doctoral position at the University of Florida, he joined the faculty at the University of California-Riverside.

At the AgCenter, Ferrin developed, presented and participated in educational programs, delivering extension and research materials to commercial fruit, landscape, ornamental plant, turf and vegetable producers. His position with the AgCenter gave him statewide responsibility for plant pathology education programs for all horticultural crops, including turf, ornamentals, fruits, vegetables and sweet potatoes.

He initiated the first-ever series of Louisiana plant pathology disease identification and management fact sheets on symptoms and signs of plant diseases. He also updated the Louisiana pesticide certification and recertification programs.

"His contributions were a remarkable testament to extension outreach," said Lawrence Datnoff, head of the plant pathology department. "It is remarkable considering the large number of horticultural crops he had to cover."

Ferrin was successful in competing for grants from government agencies and private companies and participated in grant-funded programs worth nearly $3.5 million.

"Don was intelligent, kind, patient and always curious about plant diseases," Datnoff said. "He was innovative and creative, had a splendid, subtle wit and was an absolute pleasure to be around."

"He was one of the most dedicated scientists and extension specialists we have had. He was very quiet, but very effective. The county agents respected him a lot," Coreil said.

Rick Bogren is a professor and science writer in Communications.

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