

# LOUISIANA Agriculture

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Published Since 1957

Assuring Our Future Through Scientific  
Research and Education



Helping establish  
pollinator-friendly pastures  
page 10



# Find Comfort During the Pandemic in the Outdoors

Jeff Kuehny

When life suddenly, drastically changed for everyone around the world, we were given an opportunity to stop and look inward at our own lives and those closest to us. As many of us reflected on the precariousness and fragility of life, we began to look outward for comfort and peace from the living world that surrounds us.

The term “biophilia,” meaning the “love of life” from Aristotle and other ancients, was reintroduced in the modern day by Eric Fromm, who was a German psychologist, as the sense of oneness with the natural and human world outside. Edward O. Wilson, an American biologist, expanded on the term and more clearly defined it in his 1984 book “Biophilia,” where he hypothesized that we have an inner “urge to affiliate with other forms of life.” When we commune with the flora and fauna in green spaces, we subconsciously nourish our well-being. Richard Louv, an American writer and journalist, in his book “Last Child in the Woods” linked the continual rise in childhood obesity, attention disorders and depression to what he called nature deficit disorder.



Jeff Kuehny

“When we commune with the flora and fauna in green spaces, we subconsciously nourish our well-being.”

More recently, Dr. Qing Li, an expert on forest medicine, has conducted many quantitative studies on how immersing oneself in nature can help us relax, think more clearly, improve our disposition and renew our energy. Li’s book “Forest Bathing: How Trees Can Help You Find Health and Happiness” articulates how simply connecting with nature through sight, sound, smell and touch bridges the gap between us and the natural world. It is projected that by 2050, 66% of the world’s population will live in cities. On average, Americans spend 93% of our time indoors. Gardens, arboreta and walking trails through woodlands like those we have at the LSU AgCenter Botanic Gardens at Burden are essential to improving our well-being. During this pandemic, biophilia has become a popular concept worldwide as we have been made to stop and think about the world in which we live and just how we live in it.

There are numerous examples of this here in Baton Rouge. The walking and biking trails have been filled with so many people there have been complaints about the lack of social distancing while walking. According to the 2018 National Gardening Survey, approximately 77% of American households are gardening in some form, and the desire to grow plants has exploded during the pandemic. While there have been many reports about how grocery stores have had difficulties keeping their shelves stocked, retail garden centers have experienced the same phenomenon.

As the world moves through the phases of reopening the global economy and people begin to return to work and a daily routine, it is essential that the “new normal” includes biophilia. Please join the LSU AgCenter in supporting agriculture, from the farmers who produce the food we eat, to the garden centers where we purchase plants, to the botanic gardens, arboreta, parks and public outdoor spaces that continue to provide you with a place to nourish your body and improve your well-being.

Jeff Kuehny is director of the LSU AgCenter Botanic Gardens at Burden, Baton Rouge, Louisiana.

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ON THE COVER: Stuart Gauthier, at left, LSU AgCenter agent in St. Martin Parish, and Christi Disher, manager of the Longfellow-Evangeline State Park in St. Martinville, Louisiana, check on the progress of a pollinator project planted at the park with a Feed a Bee grant from Bayer CropScience. Photo by Bruce Schultz

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## Little elected state president of 4-H at virtual conference



Anna Little

Anna Little, of Winn Parish, was elected Louisiana 4-H president during 4-H University, which was held virtually June 22-25. The other officers are Ty Hebert, of Vermilion Parish, vice president; Emily Deshotel, of Evangeline Parish, secretary; Avery Vandeven, of Tensas Parish, historian/reporter; and Mallory Meaux, of Vermilion Parish, parliamentarian.

This was the 106th annual event and the first not held on the LSU campus in Baton Rouge. 4-H'ers from across the state typically stay on campus for the week and participate in educational programs and contests, convene to elect new state officers and leadership boards, and take part in social activities. In the wake of the COVID-19 pandemic, 4-H agents and volunteers decided to move the entire event online.

"The sheer magnitude of developing the virtual 4-H University took many dedicated 4-H professionals and IT specialists," said Janet Fox, LSU AgCenter 4-H department head. "We all had a steep learning curve, but in the end, I'm so proud and amazed by the responsiveness of our 4-H professionals and the resilience of our 4-H members." **Tobie Blanchard**

## Two 4-H'ers named 'Student of the Year'

Two north Louisiana 4-H'ers have been named Student of the Year in this year's competition.

They are immediate past state 4-H president Antavion "Tay" Moore, of Ringgold High School in Bienville Parish, and Zachary Cryer, from Benton Middle School in Bossier Parish. Moore won in the 12th grade division, and Cryer was named the eighth grade Student of the Year.

The annual Louisiana Department of Education competition begins at the local level, where each school in the state submits the name of one member of its student body. From there, the students advance to regionals and then state competition. Students are selected based on academic success; career and technical achievements; leadership skills; character; and service to their schools and communities. **Johnny Morgan**



Tay Moore



Zachary Cryer



## Students donate school garden bounty to senior citizens

Students at the J.S. Aucoin Elementary School donated cucumbers from their school garden project to the Morgan City Senior Citizens Center. These three drivers — Deidre Boyd, Charlette Bartholomew and Cheri Hebert — distributed the cucumbers to the seniors. The school garden was a project coordinated by Jessica Randazzo, LSU AgCenter area nutrition agent, as part of the AgCenter's Healthy Communities program. Photo by Lisa Daigle

## Swale studies viruses that devastate bee colonies

In the fight against viruses that have devastated honeybee colonies in recent years, an LSU AgCenter researcher is eyeing a physiological pathway as a potential solution.

Entomologist Daniel Swale is working to learn more about a pathway that carries potassium ions through insects' bodies and could help combat ailments such as deformed wing virus in bees.

"We've found a new physiological pathway that can help boost bees' immune system," said Swale, who recently was awarded a grant from the U.S. Department of Agriculture National Institute of Food and Agriculture to study the pathway in bees. He also has received a second NIFA grant to study a similar pathway in aphids and stink bugs that could offer a way to control populations of the pests, which wreak havoc on agricultural crops.

In the bee project, Swale is focusing on the potassium-transport channel's connection to antiviral defenses. Much research has been done on factors negatively affecting bee colonies, Swale said, such as being exposed to pesticides and having limited foraging opportunities. But less is known about how to take advantage of bee physiology to mitigate the damage caused by those stressors.

"This study aims to bridge knowledge gaps that increase our understanding of bee immune system regulation as well as reveal novel intervention points to increase colony health and sustainability," Swale said. **Olivia McClure**



Daniel Swale

TEAR OUT



# SUGARCANE IN LOUISIANA BY THE NUMBERS

Research on sugarcane has been an integral part of the LSU AgCenter from its beginning. Sugarcane research projects are led by scientists at the Sugar Research Station and the Audubon Sugar Institute, both in St. Gabriel, Louisiana, and the LSU College of Agriculture in Baton Rouge. Continually researching and improving sugarcane production has made Louisiana one of the top sugarcane producers in the U.S.

**\$3 BILLION**

overall economic value of the Louisiana sugarcane industry.  
(American Sugar Cane League)

**No. 1 ROW CROP**

in total economic value.  
(AgCenter Ag Summary)

TEAR OUT



**500,000 ACRES**

of sugarcane grown in 24 Louisiana parishes.  
(AgCenter Ag Summary)

**1.8 MILLION**

tons of raw sugar produced in 2018.  
(AgCenter Ag Summary)

TEAR OUT



# 225 YEARS OF SUGAR IN LOUISIANA

TEAR OUT

The Louisiana sugar industry was born 225 years ago when a French-born planter bet everything on sugarcane. After pests ruined his indigo crop, Jean Étienne de Boré risked his fortune to create a commercial process to granulate sugar and converted his crop to sugarcane. His gamble in 1795 paid off. Today sugarcane is the top row crop grown in Louisiana, contributing billions of dollars to the state economy.

While the sugar industry began in 1795, many producers and scientists have worked tirelessly to improve the varieties grown in Louisiana.

## 1699

Pierre Le Moyne d'Iberville lands in present-day Louisiana to explore the land for colonization. He brings sugarcane from the West Indies.

## 1795

Etienne de Boré and Antoine Morin granulate sugar from sugarcane on de Boré's plantation in New Orleans. The Louisiana sugar boom begins.



## 1885

The Louisiana Sugar Planters Association establishes the Sugar Experiment Station at Shulze Plantation in Kenner.



## 1751

Jesuit priests are credited with the first successful establishment and culture of sugarcane in Louisiana on a plantation that covered much of what is now the Central Business District of New Orleans.

## 1843

Norbert Rillieux, a French-speaking creole, pioneered the multiple effect evaporator, which revolutionized sugar processing.

## 1888-1915

The Sugar Experiment Station tests thousands of varieties under direction of Dr. William Carter Stubbs.

## 1920s

Disease epidemics nearly destroy the Louisiana sugar industry. Other exotic varieties are imported to stave off disease. USDA research and American Sugar Cane League are established. Three-way agreement governing variety development established in 1926.

## 1950s

Louisiana researchers use photoperiod house to begin on-site crossing, leading to the development of high-sucrose varieties.

## Present day

LSU AgCenter researchers continue to develop new sugarcane varieties and improve farming procedures to help the sugar industry grow.



TEAR OUT

TEAR OUT

# From Our SOCIAL MEDIA

Join the LSU AgCenter on social media. AgCenter researchers and extension agents reach out via the web with videos, articles and helpful hints on Facebook, YouTube, Twitter and Instagram.

**Join the conversation by following the LSU AgCenter.**

 **INSTAGRAM** | Follow the AgCenter at [instagram.com/LSUAgCenter](https://www.instagram.com/LSUAgCenter)



**JULY 18** | Did you know the Louisiana Direct Seafood program helps consumers buy seafood from fishermen and vendors?

#CRABBOIL #LOUISIANA #SEAFOOD #BLUECRABS #LOCAL #LOUISIANASEAFOOD #CRAB

 **YOUTUBE** | View this video and our extensive archive at [youtube.com/user/LSUAgCenter](https://www.youtube.com/user/LSUAgCenter)

**JULY 24** | Introduction to the Hammond Research Station Virtual Field Day  
*Welcome to the 2020 Virtual Horticulture Field Day. Due to the COVID-19 pandemic and subsequent health and safety concerns, the LSU AgCenter has opted to present our stakeholders with a virtual field day in lieu of our traditional in-person field day.*



 **FACEBOOK** | Follow the AgCenter on Facebook at [facebook.com/LSUAgCenter](https://www.facebook.com/LSUAgCenter)

**JULY 1** | July is the time for figs in Louisiana, and many of the popular varieties around the state have come from a breeding program at the LSU AgCenter.



**AUG 8** | LSU AgCenter horticulture agents created a 10-week online Home Gardening Certificate Course in basic horticulture in response to the coronavirus pandemic. Over 35,000 people registered!



**AUG 29** | Photos taken in southwest Louisiana following Hurricane Laura. LSU AgCenter storm resources are available here: <https://bit.ly/StormResources2020>.

 **TWITTER** | Follow the AgCenter at [twitter.com/LSUAgCenter](https://twitter.com/LSUAgCenter)

July 31 | Mask up, Louisiana! A face mask is only effective in helping prevent the spread of #COVID-19 when it covers both your nose and mouth. #MASKUPLA @LOUISIANAGOV

## Webster elected Southern Weed Science Society president



James Holloway (left), of Syngenta Crop Protection, passes the gavel to Eric Webster during the 2020 Southern Weed Science Society annual meeting in Biloxi, Mississippi.

Eric Webster, LSU AgCenter weed scientist, has been elected the 2020 president of the Southern Weed Science Society. Webster is a professor in the School of Plant, Environmental and Sciences and the assistant director in the AgCenter's Southwest Region. His research focuses on integrated weed management, crop-weed competition, weed biology, herbicide persistence and pest complexes in rice. Webster also serves as the statewide extension specialist for rice weed management. **Annabelle Stokes**

## Smith begins 2-year term as Alumni Association president

Tara Smith, director of the LSU AgCenter's Central Region, has begun a two-year term as the president of the LSU College of Agriculture Alumni Association. A Louisiana native, Smith earned her doctorate in entomology from LSU in 2006.

Smith has made a career working with the AgCenter, and she credits her time as a student in the college as forming the foundation to make that possible. She began her career as an assistant professor and sweet potato specialist. Her dedication to the Louisiana sweet potato industry led to her promotion as the research coordinator of the Sweet Potato Research Station, located in Chase, Louisiana. Smith then was promoted to regional director, overseeing both extension and research programs. Smith remains engaged with the Louisiana sweet potato industry and has continued her role as the coordinator at the station.

Smith has been an active member of the association since 2010, previously serving as secretary and president-elect. As an employee of the AgCenter, Smith found herself working routinely with other alumni from the college. This encouraged her

to become involved with the organization. She was soon recruited to join the association's board.

"We are a great college, and our alumni are engaged and willing to give back their time, talents and financially for the enhancement of our college and to support our current students," Smith said. "We will be actively engaged in alumni recruiting, marketing our association and fundraising."

Smith encourages any alumni who want to become involved to reach out to her for more information. **Annabelle Stokes**

## Davis honored as Distinguished Undergraduate Researcher

Kathryn Davis, a recent graduate in the Natural Resource Ecology and Management program, has been honored as one of the Spring 2020 LSU Distinguished Undergraduate Researcher Award recipients. Over the past two years, Davis has been involved in a Seaside Sparrow project, which served as her honors thesis.

Davis's research began when she received funding from the President's Future Leaders In Research program, which funds LSU undergraduates to conduct research in their desired field. She started her research in the School of Renewable Natural Resources, working with Sabrina Taylor and Amie Settlecowski. She studied historical changes in the distribution of Bachman's sparrow, an uncommon and elusive native bird. She then became involved with researching the Seaside Sparrow, a tidal marsh bird with a complicated taxonomic history. Analyzing the population structure and genetic variation in Seaside Sparrows has been her focus for the past two years.

Davis credits both of her mentors for her success in her research experiences. "When I studied abroad in Australia and Argentina, both Dr. Taylor and Amie reached out to friends of theirs so I could tag along on other field studies and gain more experience. I couldn't possibly count how many drafts of my Goldwater grant and REU applications they read. I'm extremely grateful for their support over these last four years," Davis said.

Davis will continue to expand her knowledge and research experience and has been offered a position as a resident naturalist for the Alliance for a Sustainable Amazon in Peru and eventually plans to apply for graduate school. **William Gaspard Jr.**



Kathryn Davis



Tara Smith

# New Faculty PROFILE

## Ashley Edwards Aims to Stimulate Local Beef Sales

Johnny Morgan

Ashley Edwards, who hails from central Texas, began work with the LSU AgCenter on Dec. 1, 2019, as an assistant extension agent and the coordinator for regional animal science programs in the Central, Northwest and Northeast regions.

Considering her extensive background extensive background dealing with livestock where she grew up right outside of Austin, she quickly explains the difference in the way operations are structured here versus in Texas.

"That is limestone country," she said. "There are lots of rock quarries. So, the management of forage is totally different."

And it rains here, she laughingly said. "My parents wouldn't appreciate me saying that much."

Edwards, with degrees from Texas A&M University, including a Ph.D. in 2015, served as assistant professor of animal sciences at Louisiana Tech University before coming the AgCenter.

As is fairly normal for a central Texas native, Edwards said she grew up on a commercial cow-calf operation and was an avid 4-H and FFA member competing in livestock judging, goat, lamb, hog and cattle shows.

"I was the typical ag kid. I was in 4-H and FFA, and showing livestock was a big part of my childhood," she said.

Edwards feels that she had a lifetime of on-the-job experience in animal sciences before she even got to college.

"Growing up working with livestock was pretty much my entire focus," she said.

While her previous teaching role concentrated primarily on animal nutrition and livestock production, Edwards has an extensive research background in the integration of nutrition, reproduction and physiology in animal production.

"I am looking forward to having a more direct impact on livestock production, working with producers to assess their needs and goals," she said, adding that a goal is to stimulate sales of local beef and to promote Louisiana beef in the state.

Edwards has previous experience working with AgCenter experts at the North Louisiana Livestock Show at Ag Expo in West Monroe, the Louisiana State Fair Livestock Show in Shreveport and the Louisiana Producer Artificial Insemination School at the AgCenter Hill Farm Research Station.

"I absolutely love working with youth," she said, adding that her 4-H and FFA background inspires her to provide the same leadership for youth that she received from her former mentors and leaders.

Edwards has offices in all three regions and supports programming across the animal science-related areas, including commercial-scale operations, small herds and 4-H livestock activities.

Edwards and her husband, Chuck, reside near Farmersville in Union Parish. She said they don't have any livestock right now, but it's coming.

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Johnny Morgan is a writer, photographer and communication specialist with LSU AgCenter Communications.



One of Edwards' goals as a livestock specialist is to promote Louisiana beef in the state and encourage people to buy local.



Ashley Edwards is an animal sciences extension agent and coordinator for animal sciences programs with offices in the Central, Northwest and Northeast regions for the LSU AgCenter.

# ENCOURAGING POLLINATOR HABITATS in Production Agriculture

Stuart Gauthier and Sara R. Shields

Worldwide, an estimated 35% of all food production benefits from pollinators. The demand for pollinators is growing as the volume of pollinator-dependent crops has expanded 300% in the past 50 years. Grasslands and pastures provide conditions that favor pollinator establishment. Unfortunately, research has shown that pollinators are being impacted by a reduction in this type of undisturbed habitat. With the decline and fragmentation of habitat, wild and domesticated bee numbers have fallen.

Additionally, adverse weather conditions, including rain and flooding over the past three years, have significantly reduced nectar flow and, subsequently, the honey produced by more than 30,000 licensed hives statewide. Fortunately, Louisiana is blessed with more than 400,000 acres of undisturbed grasslands, which can be seeded with legumes and forbs, herbaceous flowering plants, to increase foraging opportunities for bees.

## BAYER FEED-A-BEE PROJECT

In 2018, the LSU AgCenter was awarded a \$5,000 grant from the Bayer CropScience company to enhance and expand projects underway to establish pollinator plantings. This funding has provided AgCenter extension agents with resources to establish pollinator plantings to complement previous pollinator projects. The goal of the Bayer Feed-a-Bee grant project was to improve pollinator habitats in Louisiana by planting multiple large-acreage pollinator forage sites across the state. Specific objectives of the grant included increasing Louisiana pollinator species numbers by providing diverse habitats through grant partners, creating public awareness of the importance of feed-a-bee pollinator efforts, and teaching

youth about pollinator preservation.

To address the first objective, investigators partnered with agents and specialists to distribute seed to participants. Additionally, AgCenter and University of Louisiana at Lafayette experts provided technical assistance pertaining to site preparation, planting and cultural practices, wildflower production and beekeeping.

Fulfillment of the grant requirements also included a wildflower and pollinator training held at the ULL research farm in Cade in November 2018. Training participants toured the Louisiana Department of Transportation and Development-funded wildflower seed processing facility housed at the Cade research facility. A pollinator habitat planting demonstration using hand planting methods and a utility tractor with 6-foot no-till drill were conducted during the training.

The goal to create approximately 200 acres of pollinator habitat across the state of Louisiana was undertaken in late fall 2018. Prior research indicated that under Louisiana's climatic conditions, cool-season species of pollinator mixes perform best when planted in late September through November because attempts to plant outside this time frame generally result in poor performance. Weather conditions dictated the exact timing of planting because cooler temperatures and adequate soil moisture are needed for good stand development.

One ton of Pastures for Pollinators seed mixture from Grassland Oregon was provided to agents and extension specialists in October 2018 to distribute to cattle and forages producers in their area. This 10-seed mixture of Fixation balansa clover, Frosty berseem clover, Kentucky Pride crimson clover, Dixie crimson clover, Mihi Persian clover, Dy-

namite red clover, white clover, purple top turnips, phacelia and hairy vetch is designed to be planted along with cool-season forages like ryegrass at a rate of 10 pounds to the acre or alone at 20 pounds to the acre.

Planting methods varied among participating partners. Some clipped, sprayed with glyphosate, and plowed in preparation for planting, while others clipped and used a no-till drill to plant. The use of a no-till drill was encouraged because it allows for minimal field preparation, creates low erosion potential and limits soil disturbance to resident pollinators. To extend the planting area, some of the forage producers in the Lafayette, Iberia, St. Landry and St. Martin parishes who rented the no-till drill from the local Natural Resource Conservation Service (NRCS) office in fall 2018 and 2019 were provided the Pastures for Pollinators seed mix to plant along with their cool-season ryegrass.

## REPLICATING SUCCESS

To replicate the success of the 2018 efforts and to further evaluate seed performance, investigators replicated the project in fall 2019 with an additional 1,350 pounds planted on 135 acres. Participants agreed to monitor the plots because the pollinator mix was expected to start flowering and providing pollinator habitat into fall 2019 and spring 2020. Planted areas could create a more permanent habitat, depending on adaptability and persistence.

The wide availability of pastureland for pollinator habitat and the annual fall planting of cool-season grasses created positive reception among growers who could simply add the pollinator mix into their previously existing production practices. Cattle producers benefited from the nitrogen-fixing ability of the legumes in the mixture, the high nutri-



■ **No-till drill is used to establish strong stands of Pasture for Pollinators seed mix and ryegrass for cattle grazing and forage production.**

Photo by Stuart Gauthier

tive value of the mix for grazing or hay production, and the potential for 10 months of forage and pollinator habitat availability extending from November to August. Enhancing the collaborative partnership between cattle producers and pollinator habitat development had the greatest potential for growth and adoption.

In all, 335 acres of pollinator habitat were planted in 10 parishes by more than 30 producers. Plots were visually evaluated and monitored in February and April 2019, and again in 2020, by extension agents and specialists — and on one occasion by the president and research director of Grassland Oregon, Jerry Hall. In both years, white, berseem, Persian and balansa clovers performed best in areas with Louisiana’s wet and saturated soil conditions. Redesigning a pasture pollinator mix to only include these varieties may prove to be more cost effective and successful for growers.

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Stuart Gauthier is an agriculture and natural resources extension agent in Breaux Bridge, and Sara R. Shields is the statewide coordinator for the Louisiana Master Gardener Program with offices in New Roads and Baton Rouge.



Pollinator mix plant growth in field. Photo by Stan Dutile



Clover regrowth in previously grazed pasture. Photo by Stan Dutile



Signage created public awareness of producer efforts to create pollinator habitats. Photo by Stuart Gauthier

# LSU AgCenter Goes Virtual to Fulfill Its Mission During Pandemic

Kyle Peveto

Over a few days in March, regular life changed for millions as restrictions designed to slow the spread of the virus that causes COVID-19 encouraged Americans to distance themselves from others.

Offices and schools closed, and sports were cancelled. Summer camps would close, too, leaving children and teens with idle hands.

For many young people in Louisiana, the 4-H program from the LSU AgCenter helped fill the void with online activities and contests designed to keep their minds working, said Antavion “Tay” Moore, last year’s 4-H state president.

“When everything else fell off, 4-H stayed,” he said. “4-H was there. They continued to provide opportunities for young people to grow into leaders. They could sit at home and still participate in activities that are near and dear to their hearts.”

4-H created a daily virtual recess for young students in the spring, and hundreds of 4-H’ers across the state competed and congregated online for the first virtual 4-H University. Moore, who recently graduated from Ringgold High School, even won the 4-H Has Talent show with his classical piano skills.

“They really kept me busy,” Moore said. “Events were cancelled, but my calendar stayed full for 4-H activities.”

While 4-H reached young people across the state, the AgCenter extension agents and researchers found new ways

to serve the people of Louisiana.

“Our people have stepped up and done a phenomenal job,” said William B. Richardson, LSU vice president for agriculture. “I get a lot of great comments about what they are doing, creative, innovative things, things that will probably continue on.”

## A NEW CORONAVIRUS SPREADS

In January the world learned of the new coronavirus spreading in a province of China. By the end of the month, the United States had its first case in Washington state. Louisiana saw its first positive case in March in New Orleans, and the state soon became a focal point for the nation.

“The general feeling was that medical science would keep this from growing,” Richardson said. “It just surprised people how quickly it spread. When New Orleans became a hot spot it put the emphasis on us.”

As the world began taking precautions to slow the virus, Louisiana followed. By March 12, LSU announced that university classes would go online. Gov. John Bel Edwards announced the next day that K-12 schools would close. On March 16, Richardson instructed AgCenter employees to work from home, and on March 17, all AgCenter offices were closed to visitors.



Kristopher Criscione, a graduate student working at the AgCenter Hammond Research Station, discusses media for growing plants for this video for the station's virtual field day.

## FAST ANSWERS FOR HOW TO LIVE SAFELY

In the first week of statewide social distancing, many in Louisiana were searching for answers about how to grocery shop and go about their lives safely. Wenqing “Wennie” Xu, the AgCenter food safety specialist, and Evelyn Watts, the seafood extension specialist for the AgCenter and Louisiana Sea Grant, created a fact sheets, posters and videos to help the community respond to public health concerns.

The fact sheets, available in English and Spanish — and some in Vietnamese — answered concerns for managers and customers of grocery and retail stores and restaurants and seafood processing plants. They gave tips on how to safely deliver and receive food. Another set of tips and posters in multiple languages educated shoppers and employees how to distance themselves from others in stores.

“We helped people by providing a message that is consistent with the federal and state regulatory agencies,” Xu said. “We also provided science-based educational materials to address the urgent needs of small producers and processors, food retailers, restaurants and consumers within the state.”

Food safety specialist Achyut Adhikari developed fact sheets on best practices to minimize the risk of spreading COVID-19 at farmers markets and best practices for safely harvesting fresh fruits and vegetables.

Through sharing the fact sheets and posters on social media and AgCenter websites and targeted emails, the materials were seen by tens of thousands of Louisiana residents.

## VIRTUAL FIELD DAYS REACH MORE FARMERS

Orders from Gov. John Bel Edwards in mid-March limited gatherings to 50 people or fewer. This presented a challenge to a longtime AgCenter tradition, the summer field days at agricultural research stations across the state, where researchers and extension specialists share the latest research results with farmers.

Instead of driving trailers full of producers around a field of test plots, the AgCenter experts created videos and articles with the help of the videographers and writers in the AgCenter Communications Department.

“The pandemic is not stopping us from doing research,” Richardson said after the first virtual field day at the H. Rouse Caffey Rice Research Station in July. “Our research stations have stayed open.”

The new virtual format is actually reaching more producers because the videos can be seen at any time and require no travel, said Jeff Hoy, the Sugar Research Station resident coordinator.

Virtual field days allow the “presenters to include images and graphics in their talks that will add to the content, and by going virtual, we hope to acquaint a larger, broader audience with the important work going on at the Sugar Research Station,” he said.

As of August, the AgCenter had created six virtual field days, educating producers on the latest research in rice, wheat and oats, sugarcane, sweet potatoes, horticulture, other field crops and beef cattle. Even after in-person field days return, Richardson expects to have some virtual components remain.

“I think a lot of that will continue,” he said. “I don’t see that going away.”

## 4-H ADAPTS AND KEEPS STUDENTS ENGAGED

When schools were closed across Louisiana in March, the 4-H program lost its most reliable connection to the youth of the state.

“Our program relies heavily on the agents working monthly with the youth and teachers at a school, so when schools closed, the direct communication with the youth stalled,” said Toby Lepley, AgCenter associate vice president and program leader for 4-H youth development.

As 4-H agents found ways to reach the school-age members directly, including the virtual recess activities, specialists began planning for the summer schedule. 4-H University, held each June on the LSU campus in Baton Rouge, and 4-H summer camp at the Grant Walker Educational Center, near Pollock, Louisiana, are annual highlights for many.

“As we watched the world starting to fall apart for our 4-H



A still from a video of Antavion “Tay” Moore, of Bienville Parish, captures the outgoing Louisiana 4-H president as he addresses 4-H’ers during an evening assembly of virtual 4-H University held online June 22-25.

members, we knew we had to make something happen, and that was 4-H University," Lepley said.

The 106th 4-H University was held online June 22-25 with a theme of "Ignite Your Vision." Nightly assemblies and contests went virtual. 4-H agents found innovative ways to ensure their members could participate.

When one of her 4-H'ers couldn't leave her driver's ed course in another parish for the sports broadcasting competition, Vernon Parish agent Kemberly Johnson got creative. She helped her competitors meet in a McDonald's during a break in the course and use the fast food restaurant's Wi-Fi for the eight-minute contest.

When Tay Moore needed a space to record his Mozart piece for the 4-H Has Talent competition, Karen Martin, the Northwest Region 4-H coordinator, helped him find a grand piano and a place to record at Northwestern State University in Natchitoches.

"It was pretty easy to pull off, and it turned out great," Moore said.

In all, 675 4-H'ers participated in 4-H University in 26 contests. About 200 were involved in the virtual leadership camp, Leadership for a Better Louisiana, which encourages leading through social change. Through the camp, 4-H'ers learned how they can use their talents and skills to lead change in their communities, said Meggan Franks, volunteer and leadership development specialist.

More than 1,300 Louisiana young people participated in the 4-H Virtual Summer Camp Program from June 8 to Aug. 6, said coordinator Adam O'Malley. The virtual camp included educational videos on Facebook and the Microsoft Teams group chat application.

"We covered a broad range of fun, engaging topics stretching from gardening to photography and videography to animal and culinary science with even more in between," O'Malley said.

## WHAT THE FUTURE HOLDS

Restrictions designed to stall the spread of the coronavirus that causes COVID-19 remain in place across Louisiana. Richardson and other AgCenter leaders are hopeful that some traditional events can return in 2021, but if COVID-19 persists, Richardson knows the AgCenter is prepared to continue serving the people of Louisiana.

"There is a lot of uncertainty in the next few months," Richardson said. "But we're in a position that is as good as it can be."

Many of the virtual forms of outreach that became crucial during the pandemic will likely supplement traditional educational forms in the future, Richardson said. Whatever the future holds, the agents, researchers and support employees of the AgCenter can continue fulfilling the organization's mission, he said.

"I couldn't be prouder of the way this organization responded," Richardson said.

Kyle Peveto is an assistant communications specialist with LSU AgCenter Communications and assistant editor of Louisiana Agriculture.

**STOP COVID-19, OUR HEALTH IS IN OUR HANDS**

CUSTOMERS

FOR YOUR PROTECTION,  
we temporarily closed the  
self-service line.

Droplets from a cough or sneeze can contaminate  
ready-to-eat food.

LSU AgCenter Sea Grant

LSUAgCenter.com

The LSU AgCenter and Sea Grant provide equal opportunities in programs and employment.

Stop COVID-19, Our Health Is In Our Hands: COVID-19 Information Posters for Customers and Employees (<https://bit.ly/2EvbRUQ>)

**FOOD TAKEOUT AND DELIVERY**  
During a Public Health Emergency

LSU AgCenter

**BACKGROUND**  
On Monday, March 16, 2020, Louisiana Gov. John Bel Edwards limited restaurants to only delivery, takeout or drive-through service to limit the spread of the new coronavirus that causes COVID-19. Since this decision, restaurants are relying on takeout, self-delivery and third-party delivery, such as Uber and Uber Eats, to get food to their customers. Even though the new coronavirus is not a foodborne virus — which means it may not be transferred from food — the proven transmission routes are direct or indirect person-to-person contact. Therefore, there is a need for strict measures to minimize the risk of infection transmission during food delivery.

person-to-person  
person-droplets-person  
person-surface-person

Fig. 1 The transmission routes of COVID-19

The normal routes for transferring food during takeout and delivery can be summarized in the following illustration:

- 1 Preparing food
- 2 Picking up food
- 3 Transporting food
- 4 Dropping off food

Fig. 2 A typical route taken during takeout and food delivery

Food Takeout and Delivery During a Public Health Emergency (<https://bit.ly/3jb2CrP>)

**Best Practices to Minimize COVID-19 RISK at the Farmers Market**

LSU AgCenter

COVID-19 is not a foodborne disease. Currently, there is no evidence of food or food packaging being associated with the transmission of COVID-19. This virus causes a respiratory illness, not a gastrointestinal illness, and foodborne exposure to this virus is not known to be a route of transmission.

**BEST PRACTICES AT THE FARMERS MARKET:**

- A hand-washing station with soap and a disposable towel or air dryer should be provided at entrances, exits and restrooms. Everyone should wash their hands before entering the market.
- No one should enter the market if showing symptoms of COVID-19 or after encountering a sick person.
- Keep the display area clean and sanitized.
- Food sampling should be suspended.
- Customers should not touch multiple pieces of produce. Only touch the produce you want to purchase.
- People who are handling, preparing and serving food must follow safe food-handling procedures, such as washing hands and surfaces.
- All vendors must follow proper hygiene and sanitation practices. Use alcohol-based hand sanitizers after each transaction.
- Vendors should wear gloves, but this may lend a false sense of security. Put on gloves after hand-washing and change them frequently, especially after touching your body.
- No one should be allowed to eat food or spit inside the farmers market.
- Use sanitized containers, equipment and utensils for food. Keep bags or containers to pack the produce after the sale.
- Clean all surfaces used for food contact and frequently sanitize touched surfaces. The Centers for Disease Control and Prevention (CDC) recommends using disinfectant products registered with the Environmental Protection Agency (EPA). Disinfectants recommended for use

FARMERS MARKET BUY LOCAL

PRODUCE POTATOES CARROTS

Best Practices to Minimize COVID-19 Risk at the Farmers Market (<https://bit.ly/31866xb>)



This is a note one of NOLA Couture's home sewers left in a handmade protective gown.  
Photo provided by Cecile Hardy Tanguis

# LSU College of Ag Alumna Helps Create PPE Manufacturing Network

Tobie Blanchard

She works in fashion. He works in medicine. The couple's collective skills married together helped create a supply chain to get Ochsner employees the protective gear they need during the COVID-19 pandemic.

LSU alumni, and husband and wife, Bonnie and Stephen Fletcher own a women's apparel boutique, Shake Your Bon Bon, in New Orleans, which Bonnie, who has a degree in apparel design from the College of Agriculture, oversees while Stephen works in the Neuroscience Medical 3D Lab at Ochsner Health New Orleans.

Early in the coronavirus outbreak in New Orleans, Stephen Fletcher, who has a degree in biochemistry, saw the growing demand for personal protective equipment. He and Bonnie worked to gather a team of companies from their respective backgrounds, pairing makers with evolving clinical needs.

"I want to emphasize how proximity to innovation and the ability to think creatively is what allowed us to act decisively and rapidly in our COVID-19 response," Stephen said.

Recommendations from the Centers for Disease Control and Prevention were that hospital workers at least wear a scarf if face masks weren't available, but he knew they could do better.

To adequately protect hospital employees, Ochsner needed face shields. After designing and prototyping with Scale Workspace, both parties realized they would need another manufacturer to meet their immediate needs. The Fletchers reached out to GoodWood NOLA, a design and fabrication company that had previously helped build racks and shelving for the Fletchers' Magazine Street store. GoodWood NOLA was able to shift their manufacturing to the shields.

Michael Dalle Molle, owner of GoodWood NOLA, said that within three days his company had produced 50 face shields that Ochsner doctors and clinicians were testing. The face shields design was tweaked and improved as manufacturing continued. A collaborative effort between Scale Workspace and Goodwood NOLA helped fill the demand for shields.

Soft goods such as gowns and face masks then became the priority.

"I drew on my experience helping my wife run her apparel design and retail company and asked our supply chain if they would be open to having local fabricators and seamstresses manufacture the goods we could not attain through our traditional sources due to COVID-19," Stephen said.

Bonnie said she spent long days returning to her design roots, testing patterns, sewing and sourcing fabrics. The couple called in Cecile Hardy Tanguis, owner of NOLA Couture, an apparel company with manufacturing capabilities.

Hardy Tanguis and her team ordered a massive amount of material and started cutting out masks and gowns. They also activated an army of home sewers who would come to the factory, pick up the material and sew the gowns and masks at home.

The Fletchers said with support from innovation-Ochsner and Ochsner Academics, they were able to quickly validate designs and materials through the validation chain of infectious disease, supply chain and frontline providers to scale production quickly to help fill the need with high-quality apparel and shields.

Within the first month, 75,000 face shields were manufactured in New Orleans with American parts.

"This is such a cool example of a community effort to do something so very important," Dalle Molle said.

He also said this work has allowed his business to stay open during the stay-at-home orders, and it even created additional jobs to fill Ochsner's order.

Hardy Tanguis said the same. Even though her stores

were temporarily closed, her employees were all still working, and she hired additional people to sew the gowns and masks.

"Everyone on my staff wanted to fight the good fight and be a part of this," Hardy Tanguis said. "We were working 18-hour days for several weeks because the need was so dire."

Bonnie said she never thought her world of fashion and Stephen's world of medicine would ever connect like this.

"We are used to working together for our business, being the 'dream team,' as I like to call us. But it's a whole different kind of dream, and to see that our teamwork has truly made a difference," she said.

Tobie Blanchard is director of LSU AgCenter Communications.

Married couple Bonnie and Stephen Fletcher in front of their store, Shake Your Bon Bon, show off samples of the personal protection equipment they and a team of businesses in the New Orleans area helped create for Ochsner New Orleans. Photo provided by Stephen Fletcher





An aerial applicator applies glyphosate ripener to a commercial sugarcane field in St. James Parish.  
Photo by Albert J. Orgeron

# Role of Ripeners in the Louisiana Sugarcane Industry

Albert J. Orgeron

Sugarcane is a staple crop in Louisiana, and the 2020 harvest season will mark 225 years of sugar production for the state. Louisiana has the shortest sugarcane growing season in the world because of its location farthest from the equator. Freezes are a major threat to the Louisiana sugar industry and occasionally occur during the harvest season. A freeze causes plant death and sucrose degradation within the stalk, and in extreme cases ultimately leads to deteriorated sugarcane that cannot be processed into raw sugar.

For the past three years, the state's 11 sugar factories have processed an average of 14 million tons of sugarcane. While many factories have increased daily sugarcane processing capacity over the past decade to meet increases in sugarcane production, on average it takes about 100 days to process the sugarcane crop. Thus, sugarcane processing begins in late September to reduce the impact of an untimely freeze during the processing season. A consequence of processing sugarcane in late September and early October is the low, natural level of sucrose within the stalk, especially the top third.

Glyphosate is most notably known as a broad-spectrum herbicide, but when applied at a sublethal dose to sugarcane three to seven weeks prior to harvest, vegetative growth is slowed, and the excess energy not being used for stalk growth is used by the plant to make and store additional sucrose.

Since 1980, glyphosate has been the primary ripener used in the Louisiana sugarcane industry. According to a 2005 producer survey, glyphosate was applied to approximately 62% of the total harvested acres in Louisiana, and this trend still holds true today. Polado-L was the first glyphosate product labeled and marketed for sugarcane. Development of

new salt formulations and surfactant systems for glyphosate has resulted in the EPA registration of additional glyphosate products for ripening sugarcane.

Many factors influence the effectiveness of glyphosate ripener to enhance the sucrose concentration within a sugarcane stalk. Sugarcane varieties are highly variable in their responsiveness to glyphosate. The state's leading variety, L 01-299, is highly responsive, and sucrose concentration is typically increased by 20% to 30% with glyphosate ripener, whereas the varieties L 01-283 and HoCP 00-950 respond poorly to glyphosate ripener and maximum increases in sucrose concentration range from 2% to 5%.

Harvest date is another important factor affecting the effectiveness of glyphosate ripener. Sugarcane harvested during the first 35 days of the harvest season is immature and will have the highest level of response to glyphosate ripener, whereas the response to glyphosate ripener decreases as the harvest season progresses because of the natural maturation of sugarcane.

In a 2019 experiment conducted at the AgCenter Sugar Research Station in St. Gabriel, L 01-299 was treated with 6 ounces per acre of Roundup PowerMaxII on August 9. Stalks from plots were hand-harvested and analyzed to determine sucrose concentration of sugarcane at 25, 32 and 40 days following glyphosate treatment. Sucrose concentration was increased by at least 79 pounds per ton of cane for all sampling dates, and sugar yield (pounds of sugar per acre) was 1,860 pounds greater than the untreated check on the September 18 harvest date (Table 1).

Glyphosate application rate and the treatment-to-harvest

Sugarcane with the yellowed canopy in the background was treated with glyphosate ripener and the taller sugarcane with the dark green canopy in the foreground is the untreated comparison.

Photo by Albert J. Orgeron



interval also affects effectiveness. Roundup PowerMaxII and Roundup WeatherMaxII, the two glyphosate products currently labeled and available to producers, can be applied to stubble sugarcane in Louisiana at 4 to 12 ounces per acre. As the rates increase, so does the increase of sucrose concentration in the stalk. However, sugarcane biomass is reduced by the application of glyphosate. This interaction must be carefully managed to ensure sucrose yield per acre is maximized. To this end, Louisiana producers apply these products from 5 to 7 ounces per acre. The number of days from the application to harvest, the treatment-to-harvest interval, also has an effect on the effectiveness of glyphosate ripener. While the minimum and maximum treatment-to-harvest interval allowed by the ripener label ranges from 21 to 49 days, many Louisiana growers use a 35-to-42-day interval to maximize sugar yield.

Sugarcane ripener research is conducted annually by AgCenter personnel. This research focuses on several areas and includes the responses of newly released cultivars and near-commercial experimental clones to glyphosate ripener, evaluation of new ripener practices and screening of experimental ripener compounds.

Glyphosate ripener is a useful and effective tool for the Louisiana sugar industry. When used prior to harvest, sucrose concentration per ton of sugarcane is increased, and sucrose yield per acre is maximized. Chemical ripeners allow the industry to remain competitive while managing the world's shortest sugarcane growing season.

Albert J. Orgeron is a pest management specialist and associate professor in the Southeast Region.

**Table 1. Early-season response of the sugarcane variety L 01-299 to glyphosate treatments at the LSU AgCenter Sugar Research Station in St. Gabriel, Louisiana, in 2019.**

Treatment <sup>1</sup>	Sucrose concentration (lbs/ton) 25 DAT <sup>2</sup>	Sucrose concentration (lbs/ton) 32 DAT	Sucrose concentration (lbs/ton) 40 DAT	Cane yield (tons/A) 40 DAT	Sugar yield (lbs of sugar/A) 40 DAT
Nontreated check	140b	161b	170b	38.3a	6493b
Roundup PowerMaxII @ 6 oz/A	219a	241a	261a	31.9b	8353a
Roundup PowerMaxII @ 6 oz/A + Intake @ 8 oz/A	211a	246a	258a	30.4b	7783a

<sup>1</sup> Roundup PowerMaxII was applied on August 9, 2019.

<sup>2</sup> Days after treatment; 25 DAT=September 3, 32 DAT=September 10, and 40 DAT=September 18.

<sup>3</sup> Means within a column followed by the same letter (a,b) are not significantly different.



■ Ph.D. student Karuna Kharel prepares antimicrobial film with pullulan, incorporating pecan shell extract to test its efficacy against foodborne pathogens. She is in a laboratory at Warsaw University of Life Sciences in Poland as part of a collaborative project between that university and the LSU AgCenter. Photo by Karolina Krasniewska

# Evaluation of Antimicrobials in Pecan Shell Byproducts

Achyut Adhikari and Karuna Kharel

Pecans are an economically important crop in the United States, with a total crop value of around \$470 million in 2019. Louisiana is among the major pecan-producing states, and in 2018, about 7.7 million pounds of pecans were produced in the state, contributing about \$12 million to the economy, according to the most recent LSU AgCenter Agricultural Summary.

Every year, however, almost 50% of the total nut, approximately 3.8 million pounds of pecan shells, come out as byproducts, providing little to no revenue for pecan shellers. With this amount of byproduct, growers also have to face a significant disposal issue.

To date, pecan shells have been used mostly as mulch and sparingly to treat wastewater or to generate elec-

tricity. But pecan shells could also create added value to the economy because they contain phenolic compounds, which have antioxidant and antimicrobial properties. Phenolic compounds are secondary metabolites produced by plants that may promote good health in the human body. They are classified as bioactive compounds, which have been known to be useful as a natural food preservative.

Because the current food market is moving toward minimally processed foods, there is increased concern among consumers about health risks associated with these foods and synthetic food additives. Minimally processed foods, which do not undergo any significant microbial killing step, have been contaminated with foodborne pathogens

like *Salmonella*, *Listeria monocytogenes* and *Escherichia coli* O157: H7, known as *E. coli*. Thus, the practical application of pecan shell bioactives as natural preservatives on food could potentially increase the value of pecans and the economic competitiveness of pecan growers and processors.

LSU AgCenter researchers have been testing the antimicrobial efficacy of various pecan varieties grown in Louisiana to determine applicability as a natural antimicrobial coating for foods. For this, they collected 19 different cultivars of in-shell pecans grown in Louisiana. They extracted the bioactive compounds using two extraction methods, water and ethanol, to determine the effect of the nut cultivars and extraction methods

against *Salmonella*, *E. coli* and *Listeria*, the common foodborne pathogens.

Water-extracted compounds tested more effective than ethanol-extracted compounds for some *Listeria monocytogenes* strains, whereas ethanol-extracted compounds proved to be more effective for *Salmonella* strains. Likewise, cultivars behaved differently against different organisms, which could be because of the difference in their bioactive composition. These results showed that the method of shell extraction and the pecan cultivars influenced the antimicrobial activity, and the effect was strain- or bacteria-specific. Overall, a concentration of 1.25% to 5% of extracts was found to be sufficient to inhibit the bacteria, whereas a concentration of more than 5% of the extract was found to be sufficient to kill them. The extracts were effective in reducing *Listeria*, followed by *Salmonella* and *E. coli*.

To determine applicability, these pecan shell extracts were tested against pathogens in fresh-cut cantaloupes and thawed catfish filets. The cantaloupe and catfish filets, both contaminated with *Listeria monocytogenes*, were stored at refrigerated conditions for five days after being treated with pecan shell extracts. The result was less growth of the bacteria as compared to the

control that had not undergone pecan shell extract treatment. Extracts were more effective in controlling bacteria in catfish filets than in cantaloupe. Another positive finding of the research, besides maintaining the safety of the food, was that the extracts at the tested concentrations did not affect color quality.

## SHELL EXTRACT USE AS ANTIMICROBIAL COATING

Further research is underway to explore the potential of shell extract use as an antimicrobial coating for produce or food packaging material. Pullulan, which is produced by fungi, is an edible coating material and has excellent coating properties. It is permeable to oxygen and oil and imparts no taste, flavor or color of its own when applied to food.

To study the use of pecan shell extracts in the edible film pullulan, a collaborative research project was established between the LSU AgCenter and Warsaw University of Life Sciences in Warsaw, Poland, in the summer of 2019. AgCenter researchers extracted the bioactive compounds from the Caddo variety pecan and took the material to Poland, where the rest of the study took place.

The study tested the foodborne bacteria inactivation power of pecan shell extracts incorporated into pullulan film. Results indicated the pullulan film with shell extracts effectively inhibited the growth of *Staphylococcus aureus*, *Listeria monocytogenes* and *Salmonella enterica* but was less effective against *E. coli*. However, at the tested concentrations, the film did not show any antifungal property. Currently, work is ongoing at the AgCenter to develop the pecan shell extractspullulan coating for produce like tomatoes and test its applicability on maintaining safety, quality and consumer acceptability of food.

Various plant bioactives have been gaining attention as potential natural sources for food preservatives. Pecan shell extracts could be a potential natural antimicrobial agent that has the capability to hinder growth of various foodborne bacterial pathogens. Results from this research will help Louisiana pecan growers and growers from all around the world develop efficient and effective tools to use this commercially important crop and add value to it and make growers more economically competitive.

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Achyut Adhikari is an assistant professor and extension food safety specialist, and Karuna Kharel is a graduate student in the School of Nutrition and Food Sciences.



Louisiana pecans. Photo by Olivia McClure

# Are Southern Softwood Lumber Manufacturers Ready for the Cross-Laminated Timber Industry?

Richard Vlosky and Mason T. LeBlanc

Cross-laminated timber is a multilayer mass timber product spanning two directions with precision accuracy, resulting in a secure, airtight building solution for any floor, wall, roof or core. Serving as a significantly lighter replacement for concrete, cross-laminated timber uses wood exclusively from sustainably managed forests. Cross-laminated timber opens the door to a new, ecologically friendly way to construct mass timber buildings of the 21st century. One of the biggest benefits of mass timber panels as compared with other types of structures is the ability to prefabricate the entire project. This saves time and money on-site because the installation process becomes more efficient.

The LSU AgCenter Louisiana Forest Products Development Center partnered with more than a dozen university, government and industry entities to conduct an analysis of the market environment and potential of cross-laminated timber in the U.S. South constructed from Southern yellow pine. Previous cross-laminated timber research and development has focused on using Douglas fir and other species from the Pacific Northwest as well as spruce-pine-fir from Canada and imported species from Europe.

## AN EMERGING SECTOR IN THE U.S.

Mass timber is a category of framing styles typically characterized by the use of large solid wood panels for wall, floor and roof construction in place of steel or concrete. One of these is cross-laminated timber.

Cross-laminated timber manufacturing and use in multistory buildings and other structures is well-established and fast-growing in Europe but is in its infancy in the U.S. The potential markets for cross-laminated timber in the U.S. are enormous if architects, builders, contractors, engineers and building owners accept the product as a substitute for steel and concrete construction. The South has ample Southern yellow pine resources to meet the potential market for cross-laminated timber.

## DYNAMICS OF CROSS-LAMINATED TIMBER

A study was conducted in the fall of 2018 and spring of 2019 to better understand the dynamics of cross-laminated timber perceptions, awareness and potential for adoption from softwood lumber mills in the South. Because softwood lumber is the main feedstock for cross-laminated timber, it is essential to understand the supply side. A paper survey was developed with input from key partners versed in the sawmill sector. The survey was mailed to a random sample of softwood sawmills in the South to assess the market knowledge

of cross-laminated timber and its potential in the South. The survey was sent to 412 sawmills. After accounting for firms that had gone out of business, incomplete surveys and nonresponses, the adjusted response rate was 18% with 51 useable responses.

## SURVEY RESULTS

The highest response rates were 18% in Alabama, 16% in North Carolina and 14% in Mississippi. Least represented were Tennessee at 6%, Florida at 4% and Louisiana at 4% of respondents. Most of the sawmills were moderately sized in terms of employment, with 56% employing 20-250 people, while 6% employed more than 500 and 20% had fewer than 10 employees. Because cross-laminated timber is a possible new sales channel for softwood lumber producers, the survey looked at current customer bases to see where market shifts might occur. With multiple responses possible, 35% of respondents sell to wholesalers, followed by preservative treating companies, remanufacturer and export at 18% each, stocking distributors at 12% and nonresidential builders at 9%.

While the cross-laminated timber market is poised for substantial growth, survey results indicated that respondents were generally unfamiliar with the product. Forty-one percent said they were not at all familiar with the product, while 41% were somewhat familiar and 18% were very familiar. The recent establishment of a cross-laminated timber manufacturer within the region seems to be slow in gaining the attention of Southern sawmills because 53% of respondents reported they knew nothing about the cross-laminated timber manufacturers in the U.S.; only 2% were very familiar.

While the lack in familiarity may be a concern for cross-laminated timber manufacturers hoping to locate in the South, 36% of respondents said they were somewhat or very likely to sell lumber to a cross-laminated timber manufacturer operating in the region, while 8% of respondents have already sold lumber to a cross-laminated timber manufacturer. Seventy-seven percent of respondents would not require long-term contracts with cross-laminated timber manufacturers, but 65% said they would accept them. The capability of Southern sawmills to produce cross-laminated timber-grade lumber is not an issue. Generally, respondents reported they could meet cross-laminated timber lumber specifications, with 65% indicating they could dry wood to a 10%-12% moisture content; however, 48% are able to sort and provide higher-density wood specifically for the cross-laminated timber market.

Drying to cross-laminated timber requirements and sorting by density requires a premium for many of the respondents. For drying alone, 85% of respondents would charge

a premium. Of the 26 of respondents that indicated a willingness to charge, the premiums ranged from 1%-5% (4% of respondents) to more than 20% (15% of respondents).

Many opportunities exist for educating participants in the cross-laminated timber supply chain as well as influencers such as architects and builders. Although this study established a general unfamiliarity of cross-laminated timber products and manufacturers by Southern softwood sawmills, softwood lumber manufacturers indicated interest in increasing their knowledge and expanding the industry. More than 50% would like to make contacts with builders that use cross-laminated timber, and nearly a third want to learn the technical specifications for cross-laminated timber and the feedstock they could provide.

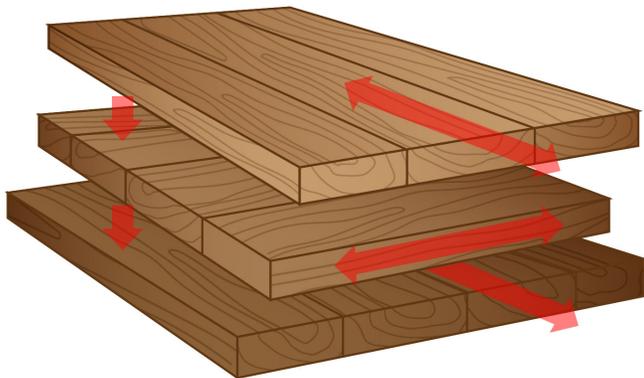
## THE FUTURE HOLDS PROMISE

Many respondents expressed a desire to learn more about and potentially enter the cross-laminated timber sector. They also expressed a positive outlook regarding cross-laminated timber use by builders in the next year (2020). Fully 58% of respondents believed that cross-laminated timber use by builders will increase somewhat or significantly in 2020. Only 6% thought the market for builders will decline.

Although the center of cross-laminated timber production has been in the Pacific Northwest, manufacturers are now focusing more attention on supplying the eastern U.S. market. Production is coming on line in the South. Cross-laminated timber production using Southern yellow pine will continue to grow significantly over the next five years. Early adopters will enjoy a competitive advantage as markets and acceptance by influencers and specifiers such as architects and builders continue to grow. In addition, building codes that accept cross-laminated timber have been developed in many states, cities and municipalities, which will foster cross-laminated timber adoption.

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Richard Vlosky is director of the Louisiana Forest Products Development Center and is Crosby Land & Resources Endowed Professor of Forest Sector Business Development in the School of Renewable Natural Resources. Mason T. LeBlanc is a procurement analyst with Drax Biomass, LLC, Monroe, Louisiana.



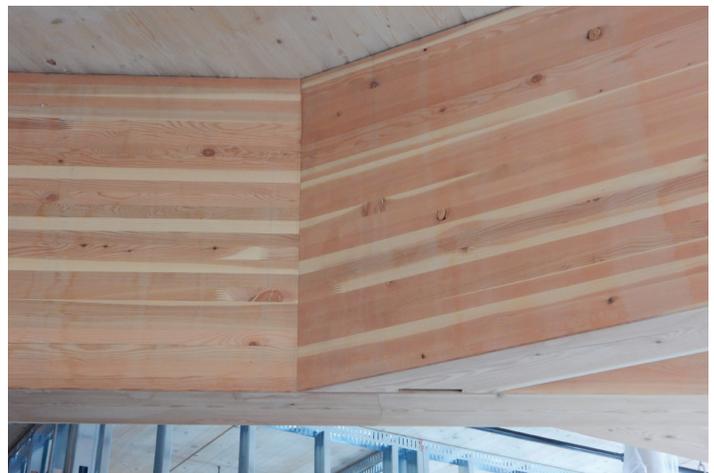
Cross-laminated lumber is a prefabricated, solid wood panel used in residential and industrial construction. It consists of several layers of boards arranged in alternating directions and then bonded together with industrial adhesives and pressed together to form a solid, straight rectangular panel. Applications include long spans in walls, floors and roofs.



A side view of cross-laminated timber shows three board glued together to make a laminate. Each layer is perpendicular to the layer below, forming the cross-laminated material. Photo by Rich Vlosky



Cross-laminated timber panels can be used in place of concrete panels in building construction. Photo by Rich Vlosky



Cross-laminated timber can replace steel I-beams in building construction. Photo by Rich Vlosky

# A COMMUNITY GARDEN Helps Make a City Healthier

Amanda Gibson

In a park in Houma, Louisiana, a city of nearly 34,000 residents in Terrebonne Parish, an unused space was given new life. It was transformed into a community garden by the Live Healthy Houma coalition, an action-oriented group of people brought together because of the LSU AgCenter's Healthy Communities initiative.

Healthy Communities is an effort by AgCenter family and consumer sciences extension specialists and researchers, along with many partnering organizations across the state, to improve the health and nutritional status of Louisiana residents, who are among the least healthy people in the country, with high rates of obesity, diabetes and high blood pressure. Terrebonne Parish is one of 20 parishes in the state targeted for Healthy Communities programs.

The Houma project began in January of 2019, when AgCenter personnel held a public forum for local residents to determine what might be done to make the community healthier. Downtown Houma is a low-income area with 50% of the population eligible for food stamps and other federal nutrition programs. The people at the forum said their biggest concern was the lack of access to fresh and affordable fruits and vegetables, and a community garden would be a way to meet this need.

Out of this discussion the Live Healthy Houma group was formed to turn this concept into reality. The Terrebonne Parish recreation department made land available in Harmon Park downtown for the group to develop 25 garden beds of varying sizes. During its first year, volunteers planted and harvested an estimated 500 pounds of produce in these gardens, which was then donated to local food pantries to help feed community members in need.

The Harmon Park Community Garden is not only a means to increase

access to fresh produce, it also serves as a learning site for children and adults. The garden welcomes school field days, where students are able to plant and harvest food. It also is the location for the Greauxing at Home program, a series of lessons that teaches families how to plant, harvest, cook and preserve food at home. This program is a collaborative effort of the AgCenter and the St. Francis Vegetable Garden, a nonprofit organization that assists with community gardens in the area.

Live Healthy Houma also secured community ownership through partnerships with local businesses. Several businesses donated items such as garden tools and plants, and each garden bed was sponsored by a local organization or club for a yearly recurring donation at a minimum of three years. Small plaques were created and placed at each garden to recognize the sponsor's contribution. In just a few months, more than \$6,000 was raised for the garden initiative through 23 local sponsors. The sponsorship fee helps cover gardening supplies and pays an employee of St. Francis Vegetable Garden to oversee garden maintenance and volunteer efforts.

The Harmon Park Community Garden is just the beginning for Live Healthy Houma. They next want to build a pavilion for respite and shade for gardeners and for cooking demonstrations. Because the garden sits in a city park, Live Healthy Houma is also planning to turn a nearby empty concrete slab into a basketball court so that kids and adults can be more physically active. The Live Healthy Houma group is finding solutions to increase access to fresh fruits and vegetables and ultimately create a healthier Terrebonne Parish.

Amanda Gibson is the extension nutrition agent with the SNAP-Ed Program in Terrebonne and Lafourche parishes.



Participants learned how to harvest produce, such as this broccoli, during the Greauxing at Home program, a series of lessons that teaches families how to plant, harvest, cook and preserve food at home. This program is a collaborative effort of the AgCenter and the St. Francis Vegetable Garden, a nonprofit organization that assists with community gardens in the area. Photo provided by Amanda Gibson



Community volunteers plant produce at the grand opening celebration for the Harmon Park Community Garden in Houma, Louisiana. Photo provided by Amanda Gibson



SNAP-Ed contributed signs for the gardens to help teach people about the health benefits of fresh fruits and vegetables. Photo provided by Amanda Gibson



Area nutrition agent Amanda Gibson, left, and a volunteer build garden bed boxes at the Harmon Park Community Garden in Houma, Louisiana. Photo provided by Amanda Gibson



Terrebonne General Medical Center employees paint their sponsored garden bed box at the community garden. Photo provided by Amanda Gibson

# More Than Just a ‘Book Farmer:’ Extension agent Gordon D. Cain remembered for improving lives

Kyle Peveto

On a Saturday in February 1922, the Richland Beacon-News ran a short item announcing a new agricultural expert in the parish, a county agent named Gordon D. Cain.

“The parish is fortunate indeed in being able to secure the service of this trained and practical student of agriculture,” the news story said.

The parish was fortunate. Richland Parish had seen six county agents come and go in a decade, and Cain had a great deal of experience. A graduate of LSU, he had grown up working farms in Louisiana and Mississippi and had been the assistant director of the agricultural experiment station in Calhoun for three years, according to a former LSU College of Agriculture professor, Gary Moore, who documented the story of this remarkable man.

However, residents of Richland Parish were known to harbor a mistrust of government workers. And these “book farmers” were not thought to have real-world farming experience. A letter to the editor the next week conveyed these concerns with a little sarcasm.

When Cain began work, he had a challenge on his hands. So he worked hard to dispel the ideas many producers had. Cain met face to face with farmers to establish a local Farm Bureau to help them organize to buy seed and fertilizer in bulk and save money. He became a fixture on their farms, worming and vaccinating hogs, treating mules for colic and caring for chickens with botulism, which they called limberneck. And he walked their fields with them to monitor crops.

Over his 26 years working in Richland Parish, Cain became an indispensable member of the community. Serving through the Great Depression and World War II, he did more than assist with farm work. Cain helped modernize the rural parish and educate youth through the 4-H program.

To honor his legacy, the Cain family endowed a chair in 1988 for a professor who researches and teaches in a discipline related to agriculture. Earlier this year, the Gordon D. Cain Endowed Chair of Agriculture was awarded to Qinglin Wu, a researcher in the LSU AgCenter School of Renewable Natural Resources.

Born in 1886, Gordon Dunn Cain grew up working on farms and in stores in Louisiana and Mississippi. He graduated from Clinton High School in East Feliciana Parish in 1903, studied at LSU and worked as a grocery store clerk and a bookkeeper for a Mississippi lumber company.

In May of 1909, at 22, Cain graduated with a degree in

chemistry. He planned to go to medical school, but he could not afford the tuition. Instead, he took a job teaching seventh grade in Slidell. His salary was \$50 a month.

After the school year ended, Cain became an assistant chemist analyzing fertilizers and agricultural products in the Fertilizer and Foodstuff Laboratory of the Louisiana Agricultural Experiment Station. Cain and Ola Arbuthnot married in New Orleans in 1911 and started a family, having sons in 1912 and 1914. In 1918 Cain was hired as the assistant director of the North Louisiana Experiment Station at Calhoun in Ouachita Parish.

Tragedy struck not long after their third son was born. Ola died of the flu during the Spanish flu pandemic in January 1919. Later that year Cain married Ruth Finklea of Calhoun. They would have three daughters in addition to Cain’s three sons with Ola.

“ Because they were one of the first families to have a telephone, anyone could stop by and make a call. After all, the house was never locked. ”

In 1922, the family moved to Richland Parish, and Cain worked tirelessly. In his diary Cain kept track of every hog he vaccinated and wrote down the mixture of turpentine and castor oil he used to treat limberneck in chickens, according to entries gathered by professor Moore. On occasion Cain traveled across the country to assist with livestock purchases. Once he went to Wisconsin to help a parish resident buy dairy cows, and Cain recorded each cow’s pedigree records.

Around the parish seat of Rayville, the Cains were known for giving clothes and warm coats to children who needed them. Because they were one of the first families to have a telephone, anyone could stop by and make a call. After all, the house was never locked.

While Cain had gained the respect of the parish, funding his position was difficult in those times. At the end of 1926 Cain resigned after the parish could not pay his \$275 per month salary. But the Richland Parish Police Jury did find \$175 to hire him as a deputy clerk of court, and he continued serving the agricultural needs of the parish along with his

desk job. By the summer of 1928 the parish was able to rehire Cain as the county agent.

During the Great Depression, Cain promoted new government programs to the parish. In one week he met with more than 3,000 people to explain the Cotton Acreage Reduction Program.

When the Rural Electrification Administration came to town, many rural residents were reluctant to sign on because of a fear of the new technology. But they trusted Cain. "If Gordon Cain said it was OK," one extension agent said, "then they did it."

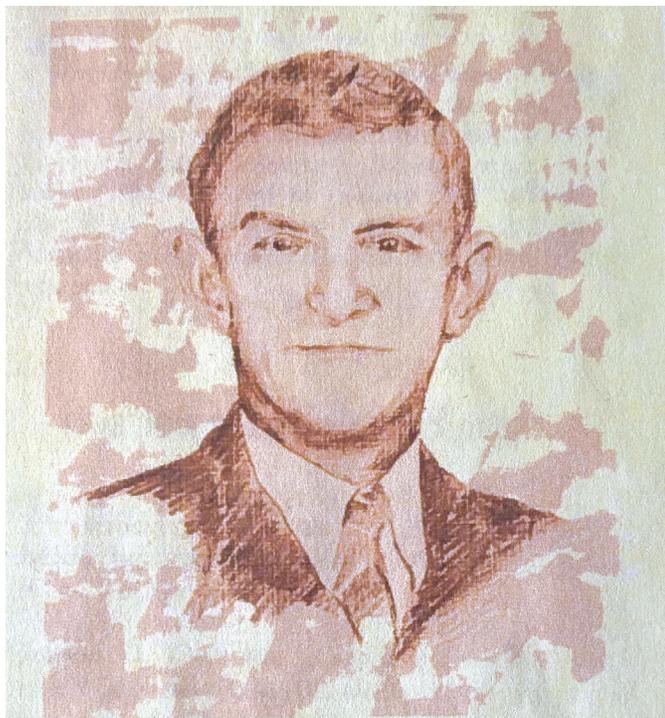
In late 1948 Cain retired. At the end of his career the parish surprised him with a celebratory banquet. Cain introduced the next agent, Basil Doles, to the people of the parish.

"Within a week, Mr. Doles was accepted by the farmers and was on his way to being a successful agent in Richland Parish," professor Moore wrote in his biographical sketch. Cain's decades of hard work had done away with the idea that college-educated "book farmers" were of no help.

Cain lived in Rayville until his death in 1958. After he died, the Beacon-News published an anonymous poem in his honor. "His heart and soul were in his work," it read. "Not for a moment did he shirk, / He gave his all, his every bit, / His time, his will and wit." The poem was titled "A Real Man."

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Kyle Peveto is an assistant communications specialist with LSU AgCenter Communications and assistant editor of Louisiana Agriculture magazine.



**GORDON D. CAIN**

## RESEARCH BRIEF: Perception of Crime and Willingness to Use Space for Physical Activity in Madison Parish

Matt Greene, Jessica Stroope, Joy K. Sims, Jamila Freightman and Denise Holston

Madison Parish in northeast Louisiana is one of the parishes targeted by the LSU AgCenter for improvements in the health status of its residents through a program called Healthy Communities. This program is funded through a grant from the U.S. Centers for Disease Control and Prevention. Having safe and accessible places to walk and exercise increases the likelihood of community members engaging in physical activity. The CDC Healthy Communities grant prioritizes community input to guide project implementation. A Healthy Communities forum in Tallulah, the parish seat of Madison Parish, identified unsafe, unusable walking trails and sidewalks and lack of fitness facilities as barriers to physical activity.

In response, the local Healthy Communities coalition focused on revitalizing the unused Fairgrounds Park, known locally as the Slab. Through funding provided through the CDC grant and local in-kind donations of labor and planning, the Healthy Communities coalition was able to make significant improvements, including repairing basketball goals, creating painted play spaces, adding a shade structure, and installing benches and trash cans.

During the revitalization, experts were brought in to help the community address concerns about potential crime. Recommendations included hosting regular events, posting park hours and rules for use, scheduling regular police surveillance, cleaning up litter and graffiti, and planting shrubs and greenery. Unfortunately, in May 2019, one year after the project was completed, the park was hit by a storm that destroyed the shade structure, bent benches and damaged trash cans. Interviews five months after the storm assessed youth and adult perceptions of the park and perceived willingness to use the space for physical activity.

Interviews were held with two educators and a law enforcement professional, and a focus group was held with six high school students, some of whom attended the school next to the park. Researchers' interpretations of results were confirmed by interview participants in follow-up meetings. The educators perceived a reduction in crime after the park revitalization. The law enforcement professional reported crime was low before and after the project. All three adults mentioned a reduction in the presence of people perceived to be associated with crime as a result of the project. However, all adult interviewees expressed they would not feel safe exercising in the area. Youth focus group participants asserted that the perception of crime was an ongoing issue and expressed concern about the area, particularly related to gangs and gun violence.

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Matt Greene is a SNAP-Ed evaluation coordinator, Jessica Stroope is a research associate, Joy K. Sims is a SNAP-Ed extension agent, Jamila Freightman is CDC Healthy Communities program manager, and Denise Holston is an assistant professor and extension nutrition specialist in the School of Nutrition and Food Sciences.

# UNDERSTANDING GLYPHOSATE

## and Its Role in Agriculture

Kim P. Brown and Daniel Stephenson IV

Glyphosate was first discovered as a herbicide in 1970 by John Franz, a chemist with Monsanto. In 1974, glyphosate was marketed to the public as RoundUp. The first RoundUp Ready crops were released in 1996-1997. Since then, the use of glyphosate has increased greatly in both agriculture and as an herbicide for homeowners to eliminate weeds in areas around the home.

Glyphosate has become a word that for some people incites fear and misunderstanding. In recent years, there have been social media posts and articles claiming that glyphosate has been found in human breast milk and cereal. While both of these claims have been disproven, this continues to cause concern for many. In the fall of 2018, a California jury awarded a groundskeeper \$289 million in a civil suit against Monsanto's RoundUp with the active ingredient glyphosate. A year later, another California jury awarded a couple just more than \$2 billion in a similar case. These two cases are currently being appealed. However, the rulings of these two cases have initiated an onset of civil lawsuits against Monsanto. Now when watching television, viewers are barraged with commercials for class action lawsuits against Roundup Weed Killer. This may unnecessarily strike fear into people not familiar with this product.

### HOW DOES GLYPHOSATE WORK?

Glyphosate works by disrupting the shikimic acid pathway through inhibition of EPSP synthase, which are not found in animals, including humans. The shikimic acid pathway is a metabolic route used in plants and some bacteria, fungi and algae to produce critical amino acids. Glyphosate disrupts biosynthesis of three aromatic amino acids in plants causing starvation and eventual death.

### WHAT ATTRIBUTES MADE GLYPHOSATE SO COMMONLY USED AS AN AGRICULTURAL AND RESIDENTIAL HERBICIDE?

It has a broad spectrum of activity, is not volatile and has no odor and little to no residual soil activity. It is also highly effective and inexpensive. In addition to the listed attributes, glyphosate has a very favorable safety profile for mammals and aquatic life. Glyphosate is a "dirt lover" and will bind tightly to most soil and sediments in the environment. Glyphosate is degraded into carbon dioxide and phosphate by microorganisms and, thus, does not bioaccumulate.

### HOW CAN GLYPHOSATE ENTER THE HUMAN BODY?

When skin is exposed to glyphosate, roughly 2% dermal absorption will take place. Also, glyphosate is nonvolatile, which in turn makes the likelihood of inhalation exposure not significant. If glyphosate is ingested, 30% of the product is absorbed in the digestive tract and the rest is excreted. Glyphosate has a very favorable overall safety profile. It has an LD50 (lethal dose that it takes to kill 50% of a test population) of 5,000 milligrams per kilograms. For reference, aspirin and sugar have LD50s of 200 and 3,000 milligrams per kilograms, respectively.

### WHAT ABOUT THE CLAIM THAT GLYPHOSATE CAUSES CANCER?

As stated previously, there have been a few cases that have influenced popular opinion resulting in many people believing that glyphosate causes cancer. Regulatory agencies in the United States, the European Union, the Joint Meeting on Pesticide Residues of the United Nations and World Health Organization (WHO), and others around the world have evaluated both animal and human studies on cancer rates associated with glyphosate. Based on the results of those studies, these regulatory agencies determined that glyphosate is not likely to be carcinogenic. However, the International Agency for Research on Cancer (IARC), of the WHO, evaluated a smaller number of studies and reported that glyphosate is probably carcinogenic.

### WHY IS THERE A CLASSIFICATION DIFFERENCE FOR THE IARC AND U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)?

The answer can be broken down into what questions each agency considered. The IARC asked: Can glyphosate possibly cause cancer? The EPA asked: Is glyphosate likely to cause cancer? The question that the EPA considered is really a two-part question: Can it cause cancer? What level of exposure is expected? The IARC only considers whether or not glyphosate can cause cancer, while the EPA considers whether glyphosate can cause cancer and the risk associated with the potential to cause cancer. Both questions are very important

■ A soybean plot treated with glyphosate at the LSU AgCenter Scott Research, Extension and Education Center in Winnsboro, Louisiana.

Photo by Olivia McClure





when understanding the possibility and probability of a problem taking place. The EPA's second part of the question takes into consideration risk assessment and risk management. All pesticides approved by the EPA have detailed directions on the pesticide label. When developing these labels, a significant amount of research is conducted to assess risk associated with the pesticide. After label approval by the EPA, the risk assessment information is used to develop the direction for use to manage risk associated with the pesticide. All products sold in the U.S. that contain glyphosate have labels approved by the EPA, thus risk has been assessed and directions to mitigate or manage that risk are provided as part of the pesticide label.

## WHAT ABOUT GLYPHOSATE BEING FOUND IN FOOD?

The question can be answered from a regulatory standpoint of pesticide residue and human exposure. The EPA has daily exposure limits for pesticide residues on foods that are 100 times below levels shown to not have a negative effect on human health. So, the EPA has a 100 times safety factor with

pesticide residues in food stuffs. In addition to the efforts of the EPA, the U.S. Food and Drug Administration monitors food to ensure that pesticide levels stay below established thresholds.

Glyphosate products have been safely and successfully used for more than 40 years. Based on current, reliable scientific evidence, glyphosate use does not pose health problems for consumers. Many of the reports about pesticides, including glyphosate, in and on food has raised concerns for the general public and frightened many away from the "dirty dozen" foods. These claims are misleading because it does not tell us anything about how much of any pesticide is found on the produce or how much risk of residue carryover. In order for pesticides to be used on food crops in the United States, scientific and governmental agencies must conclude that they pose no increased risks to consumers before they are allowed to be sold. Glyphosate, when applied based on label directions, presents very low risks to the environment and human health.

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Kim P. Brown is the statewide pesticide safety education coordinator, and Daniel Stephenson IV is a weed scientist and professor, both at the LSU AgCenter Dean Lee Research and Extension Center, Alexandria, Louisiana.



Increased production of corn is one of the benefits of the use of glyphosate in agriculture. Photo by Bruce Schultz

## LSU AgCenter Works to Ensure Safe Use of Pesticides

Kim P. Brown

The primary goal of the LSU AgCenter Pesticide Safety Education Program is to provide training for private and commercial pesticide applicators on how to use pesticides safely, effectively and correctly. The program works to provide precertification training and recertification training for those applicators that require certifications to use and purchase pesticides.

Pesticides include insecticides, herbicides, fungicides, rodenticides and materials used to sanitize and clean the inside of structures and homes. The program works with the Louisiana Department of Agriculture and Forestry's Pesticide Division to obtain approval to provide training to those applicators that need recertification and training.

Private pesticide applicators are individuals who use restricted-use pesticides to produce agricultural commodities for sale on property owned or rented by them or their employer. Commercial pesticide applicators are individuals who use restricted-use pesticides, normally for hire, for any purpose or on property other than that specified in the definition of "pesticide applicators." In Louisiana there are approximately 7,000 private pesticide applicators and approximately 4,000 commercial pesticide applicators. There are more than 21 specific categories that commercial pesticide applicators can be certified in, including ornamental and turf pest control, right-of-way pest control, agricultural pest control and forestry pest control.

In addition to pesticide applicator precertification training and recertification training, the program works to provide additional materials and information to assist pesticide applicators in their jobs. This includes working to get updated information out to applicators on regulation changes and how to improve safety and accuracy before, during and after pesticide applications.

Another area of focus for the program is educating the public on the proper and safe use of pesticides, both conventional and organic. This includes providing information to the LSU AgCenter Master Gardeners and Advanced Master Gardeners on how to safely, effectively and correctly apply pesticides around the home. It is critically important that anyone applying products to control pests review and follow label instructions to ensure safe and proper use of products.

The Pesticide Safety Education Program works with AgCenter specialists to bring up-to-date information to pesticide applicators so they can make better informed application decisions. Many of these opportunities take place during recertification trainings hosted by the AgCenter. In addition, the program works to assist different professional organizations, including the Louisiana Agricultural Aviation Association, the Louisiana Turfgrass Association, the Louisiana Agricultural Consultants Association, the Louisiana Pest Control Association, the Louisiana Mosquito Control Association, and the Louisiana Vegetation Management Association.

Pesticides are important tools in protecting public health and the environment, and the LSU AgCenter strives to improve proper use of these valuable tools. For more information and the latest updates, go to Pesticide Safety Education Program on the LSU AgCenter website at [www.LSUAgCenter.com](http://www.LSUAgCenter.com).

Kim P. Brown is the LSU AgCenter pesticide safety education coordinator.

## Inside:

*The need has not been greater to expand and enhance habitat for bees and other pollinators. A grant from Bayer CropScience has boosted LSU AgCenter efforts to help producers establish pollinator-friendly pastures.*

*See page 10*

*"When everything else fell off, 4-H stayed." That's how Tay Moore, the outgoing 4-H state president, described the way the LSU AgCenter quickly stepped in with online activities and virtual events — even a virtual 4-H summer camp — to meet the educational needs of Louisiana youth during the pandemic. Read more about the LSU AgCenter's response.*

*See page 13*

*Louisiana has the shortest sugarcane growing season in the world, and the use of ripeners on the crop has enhanced sugar production. LSU AgCenter researchers studied the effects of the timing of applications to get the most efficient use of this tool.*

*See page 18*

*Cross-laminated timber opens the door to a new way to construct homes and buildings. If the Southern timber industry can overcome its concern for the unknown, production of this product offers an economic boost the forestry business.*

*See page 22*



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