

LOUISIANA Agriculture

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Assuring Our Future Through Scientific Research and Education

*Seeding the coast
Sealing oil wells
Growing the
landscape industry*



Water Issues in Rice Production

Plentiful, good quality water was one of the major attractions of southwest Louisiana more than 100 years ago when farmers who moved there to try growing rice. Later, when deep wells were drilled, it became evident the region had abundant groundwater, too. The rapid spread of rice production in southwest Louisiana was facilitated by the establishment of canal systems. Typically, these systems would be anchored by a pumping plant on a river or bayou. Most of these pumping plants had steam engine-driven pumps that could lift large volumes of water. A large irrigation canal or system of canals would then be constructed leading away from the pumping station, often for more than 20 miles. The rice fields adjacent to the canals could then be flooded. In return for water, the rice farmer would pay a percentage of rice sales to the canal company. Over the past 40 years, however, most of these major canal systems have disappeared. Their loss has necessitated the drilling of numerous deep wells to keep many fields in rice production.

Today, about 60 percent of Louisiana's rice acreage is flooded from deep wells and 40 percent from surface water. If surface water is available, it is the irrigation source of choice because it takes much less energy to lift water a few feet from a surface water source rather than several hundred feet from a deep well.

Surface water quality and quantity has become a major issue in Louisiana rice production because of the declining rate of average annual rainfall. According to records at the Rice Research Station, the average annual rainfall over the past 100 years has been just below 60 inches. Yearly rainfall has varied, however, from a high of 106 inches in 1940 to a low of 31 inches in 1921. In just the past few years, this number has varied from a high of 73 inches in 2004 to a low of 37 inches in 1999. By mid-December 2011, it was 42 inches.

Drought conditions have left some surface water pumps on smaller drainage systems with little or no water to pump. Perhaps more important is the relationship between our watersheds and the Gulf of Mexico. Our rivers, bayous, streams and drainage ditches remove excessive rainfall and eventually dump this water into the Gulf. As this fresh water moves south, it becomes increasingly brackish as it interacts with seawater. Under normal rainfall conditions, the brackish water remains south of surface water pumps. However, under drought conditions, this high-salinity water begins to move north. Rice is a freshwater plant and will not produce well and eventually will die as salinity levels in irrigation water increase.

This is the situation in many rice production areas of Cameron, Calcasieu, Jefferson Davis and Vermilion parishes. In addition to drought, the Lehman-Bowman locks on the Gulf Intracoastal Waterway were recently damaged and will not be repaired for several months. This allows additional high-salinity water to flow north. The bottom line is that unless we receive high levels of rainfall this winter and early spring, many of these areas will not be able to produce a rice crop next summer.

While this high-salinity water is not a problem every year, it is occurring with increasing frequency. It also affects freshwater marsh holdings, waterfowl hunting, freshwater fishing, alligator egg collection and hunting, as well as the vast beef industry along the coast. Beef producers are beginning to worry about fresh drinking water for their herds.

A coalition has been formed to study long-term solutions. One idea is to divert fresh water into the region from the Mermentau River basin. The Tech/Vermilion diversion project already in place shows this can be done successfully. Any such diversion project has a many obstacles to be overcome, including the finding of funding sources. ■

Steven D. Linscombe, Director, LSU AgCenter Southwest Region, Crowley, La.

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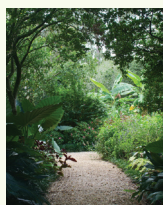
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Contents

- 2 **Water Issues in Rice Production**
Steven D. Linscombe
- 4 **What's New**
- 6 **Aerial planting of smooth cordgrass using a fixed-wing airplane and airboat**
Herry S. Utomo, Cindy S. Steyer, Ida Wenefrida, Steven D. Linscombe, Daniel Breau, Cassidy LeJeune, Dale Garber and Shane Faust
- 9 **TigerBullets: A newly created wood-plastic product to control lost circulation in oil drilling**
Qinglin Wu
- 11 **LSU AgCenter serves nursery and landscape industry**
Regina P. Bracy
- 12 **A new beginning for the Burden Center**
Jeff S. Kuehny
- 14 **Field of Excellence: Turfgrass matters in sports**
Ron Strahan and Jeff Beasley
- 15 **Field of Excellence and Les Miles**
Linda Foster Benedict
- 16 **Watch out for new ornamental plant and lawn diseases**
Donald M. Ferrin
- 17 **Chilli thrips threaten Louisiana Knock Out roses**
Dennis Ring
- 18 **Biocontainers provide sustainability in greenhouse industry**
Jeff S. Kuehny, Mike Evans and Matt Taylor
- 19 **Drift series roses: New landscape shrub**
Allen D. Owings
- 20 **Urban gardening mecca – Hammond Research Station**
Regina Bracy
- 22 **Warm-season landscape plant evaluations at the Hammond Research Station**
Allen D. Owings, Regina P. Bracy and Roger Rosendale
- 24 **Using plant growth regulators in the landscape**
Yan Chen, Regina P. Bracy and Allen D. Owings
- 26 **Controlling weeds in flowerbeds**
Ron Strahan
- 28 **Crop Residue Biomass Production in Louisiana**
Hector Zapata, Michael Dicks, David Maradiaga and Huzein Niu
- 30 **Autonomous boats offer solutions to environmental tasks**
Steven Hall, Daniel Smith, Brian Thompson and Jake Farlow



ON THE COVER: Windrush Gardens at the Burden Center. Photo by John Wozniak

What's New



Leonard named associate vice chancellor

B. Rogers Leonard, an award-winning entomologist, has been named the new associate vice chancellor for research in the LSU AgCenter. He will also have the title of associate director of the Louisiana Agricultural Experiment Station.

Leonard's specialty is insect pest management in cotton, corn, grain sorghum and soybeans. Over the course of his career, he has helped farmers in Louisiana and across the South save money in production costs and increase yields through more effective pest control methods.

Leonard joined the AgCenter as a researcher in 1990 at the Macon Ridge Research Station in Winnsboro, La., after completing his Ph.D. in entomology at LSU. He was promoted from assistant professor to associate professor in 1994 and then to professor in 1999.

While conducting research at the Macon Ridge Station, Leonard has been on the graduate faculty of the LSU Department of Entomology in Baton Rouge, where he has overseen the research of dozens of LSU master's and doctoral students.

In 2006, he was named the Jack Hamilton Chair in Cotton Production. This award was created by the Louisiana Cotton Producers Association, the Louisiana Independent Cotton Warehouse Association and the Louisiana Cotton Ginners Association to honor Jack Hamilton, a long-time cotton farmer, now deceased, from Lake Providence, La.

Leonard's honors include the 2012 Recognition Award from the Southeastern Branch of the Entomological Society of America, which was announced in 2011; the

LSU AgCenter Doyle Chambers Research Award in 2011; the LSU AgCenter Ken Tipton Team Award in 2011, 2006 and 1998; the National Conservation Systems Cotton Research Award in 2007; and the LSU AgCenter First Mississippi Award for Research in 1998.

In 2009, he was named to the Louisiana Agricultural Consultants Association Hall of Fame. He has served on the state boll weevil commission and on the technical advisory group for boll weevil eradication.

Leonard received his bachelor's degree in agronomy in 1984 and his master's degree in entomology, also from LSU. During his career, he has received more than \$7.4 million in grants and contracts to support his research. ■ **Rick Bogren and Linda Foster Benedict**

Rice farmers renew checkoff

Louisiana rice farmers agreed to continue paying a nickel for every 100 pounds of rice for research and 3 cents per hundred pounds for promotion for the next five years. The vote was held Jan. 17. The totals showed 357 producers voting for the research check-off and 65 voting against, or 85 percent in favor of the measure and 15 percent against. The promotion referendum was approved 321 to 107, or 75 percent for and 25 percent opposed.

Jackie Loewer, a rice farmer from Branch, La., and chairman of the Louisiana Rice Research Board, said the vote shows that an overwhelming majority of farmers approve of check-off funding. ■ **Bruce Schultz**

Tallulah 4-H'ers learn technology



Wright Elementary School fifth grader Samarria Brooks assists fourth grader Kennara Fountain in printing her photograph in the 4-H photography project. Photo by Johnny Morgan

TALLULAH, La.—Technology has changed 4-H Club Day in Madison Parish. Instead of a standard 50-minute meeting, reading minutes and preparing for the next contest or event, 4-H Club Day for 4-H members in this northeast Louisiana town is conducted with a mobile technology lab, according to LSU AgCenter 4-H agent Karol Osborne.

"Students select from six subject-matter areas this year – horses, pets, sewing, photography, environment and babysitting. With a PowerPoint presentation to serve as their navigation tool, they explore whatever they choose."

The presentation takes them to video tutorials, websites and even learning games

that provide more information on the subject area they are exploring. It takes all year to go from level one to level six in one of the subject-matter areas.

What Osborne found is that a large number of the children are staying with their project instead of bouncing around to several. However, some students find the experience so exciting, they want to explore all of the subjects.

Osborne's students are combining the LSU AgCenter's grant-funded Reading to the Heart literacy curriculum with computer-assisted learning to help them complete 4-H projects at school and at home.

"We're focusing on literacy enrichment



Graduates of the Louisiana Master Farmer program were honored on Jan. 12 at the annual convention of the Louisiana Association of Conservation Districts in Lafayette. Pictured left to right, are Louisiana Cattlemen's Association President Vendal Fairchild, Jo Ann Calais of Acadia Parish, LSU AgCenter Chancellor Bill Richardson, Cecil Ramagos Jr. of Iberville Parish, Robbie Howard of East Carroll Parish, Elliott Bizette of Pointe Coupee Parish, Keith Howard of East Carroll Parish, David Bergeron of Avoyelles Parish, Ronald Hebert of Iberia Parish, Jack Dailey of Franklin Parish, Wesley Coffman of Vernon Parish, Louisiana Master Farmer Coordinator Ernest Girouard and Kevin Norton, state conservationist for the Natural Resources Conservation Services. Photo by Bruce Schultz

with the grant, but we're also bringing that into the 4-H program," Osborne said. "This has given us greater visibility and helped establish greater collaborations with the schools." ■ **Johnny Morgan**

11 more join ranks of Louisiana Master Farmers

Eleven men and women were honored on Jan. 12 for completing the Louisiana Master Farmer Program. The ceremony was conducted as part of the annual convention of the Louisiana Association of Conservation Districts.

"This is one of the most rewarding things we do – recognize farmers who have gone through this rigorous program," said Bill Richardson, LSU AgCenter chancellor.

To be certified in the Master Farmer Program, participants must undergo classroom training, attendance at model farm field days and development of a farm-specific conservation plan. In addition, they receive training updates.

Partners in the program are the LSU AgCenter, Louisiana Farm Bureau, Louisiana Department of Agriculture and Forestry,

Louisiana Cattlemen's Association and Natural Resources Conservation Service.

Sugarcane farmer Ronald Hebert of Iberia Parish was recognized as Outstanding Master Farmer of the Year. He received a \$1,000 check from the Louisiana Land Bank and a \$1,000 savings bond from the Gowan Co. Hebert has been farming sugarcane in an operation begun by his father in 1946. Hebert was certified as a Master Farmer in 2010, and his farm was chosen as a model farm in 2008.

Those certified as Master Farmers were David Bergeron of Avoyelles Parish, Elliott Bizette of Pointe Coupee Parish, Jo Ann Calais of Acadia Parish, Jerome Cantrelle of Lafourche Parish, Wesley Coffman of Vernon Parish, Jack Dailey of Franklin Parish, Keith Howard and Robbie Howard of East Carroll Parish, Cynthia LeBlanc of Calcasieu Parish, Cecil Ramagos Jr. of Iberville Parish and Danny Suggs of Claiborne Parish.

Ernest Girouard, LSU AgCenter coordinator of the Master Farmer Program, briefed the convention on the success of the mobile conservation classroom. He said all Vermilion Parish fourth- and fifth-grade students have been through the classroom

since it began touring the parish last year, and the program will expand to include more grade levels. Girouard also said the classroom will be traveling to other parishes.

The 11 added at this year's ceremony brings the total number that have been certified to 135. Louisiana was the first state to establish such a program in 2001. ■ **Bruce Schultz**

Veterinary Science, Animal Sciences merge

The LSU Board of Supervisors approved the merger of the Department of Veterinary Science into the School of Animal Sciences at its meeting Feb. 3. The merger will strengthen the research and extension programs in both units and complement their move into the new Animal and Food Sciences Laboratory Building that is being built on the Baton Rouge campus, said LSU AgCenter Chancellor Bill Richardson. The faculty and research programs will not change, and shared teaching appointments with the School of Veterinary Medicine and the College of Agriculture will continue, he said. ■ **Rick Bogren**



Herry Utomo, LSU AgCenter molecular biologist, watches an airplane drop smooth cordgrass seed on artificially created land on Marsh Island south of Vermilion Bay. Utomo used smooth cordgrass germplasm from across the state to develop a hardy variety that will produce a large amount of seed. Photo by Bruce Schultz

Aerial planting of smooth cordgrass using a fixed-wing airplane and airboat

Herry S. Utomo, Cindy S. Steyer, Ida Wenefrida, Steven D. Linscombe, Daniel Breaux, Cassidy LeJeune, Dale Garber and Shane Faust

Direct seeding of smooth cordgrass (*Spartina alterniflora*) using aerial applicators, such as a fixed-wing airplane or airboat, can establish healthy vegetation in a single season, delivering rapid stabilization of newly constructed or nourished marshes. This application has potential to provide significant economic and environmental benefits because dredged sediments are increasingly being used in coastal restoration efforts

to reclaim large areas of land loss.

Sediment harvested from adjacent open-water sources or pumped from sea or river bottoms miles away is used strategically in constructing terrace fields, re-establishing lake rims and creating emergent marsh areas. Within the Coastal Wetlands Planning, Protection and Restoration Act Program, the size of individual marsh-creation projects has typically ranged from approximately 200

to 700 acres. Marsh-creation projects are being implemented on an even larger scale through other restoration programs, including state-funded projects, the Clean Water Act Compensatory Mitigation Program and the U.S. Army Corps of Engineers' Beneficial Use of Dredged Material Program, which alone has created more than 27,000 acres of marsh. In addition, recent state and federal comprehensive coastal planning

Herry S. Utomo, Associate Professor; Steven D. Linscombe, Professor; Ida Wenefrida, Assistant Professor-Research, Rice Research Station, Crowley, La.; Cindy Steyer, USDA Natural Resources Conservation Service, Baton Rouge, La.; Daniel Breaux, U.S. Fish and Wildlife Service, Lacombe, La.; Cassidy LeJeune, Louisiana Department of Wildlife and Fisheries, New Iberia, La.; Dale Garber, USDA NRCS, Crowley, La.; Shane Faust, Coastal Protection and Restoration Authority, Baton Rouge, La.

efforts have evaluated restoration alternatives that would include tens of thousands of acres of marsh creation using dredged sediments in the near future.

Rapid development of vegetation cover with the appropriate plant species is critically important to provide adequate protection for these newly constructed marshes and marsh structures. At the end of dredging operations of each project, the seed can be delivered aerially as soon as the fluidity and strength of deposited soils can adequately support the biomass of the growing plants. Rapid revegetation can also help prevent the establishment of invasive species on these exposed sites.

Coastal land loss and consequences

Reducing the rates of coastal marsh loss in Louisiana and preserving this productive estuarine ecosystem are not only crucial to the economy of the state but also to the life and culture of many people who depend on this environment. Louisiana lost 1,883 square miles of coastal lands between 1932 and 2010. Without intervention, another 513 square miles are predicted to be lost by 2050.

Louisiana's coastal wetlands provide critical habitats for nearly 90 percent of species in the Gulf of Mexico and 98 percent of commercial fish and shellfish. More than five million ducks, which is 20 percent of the continental population, winter in Louisiana each year. During the peak spring migration season, about 25 million birds arrive in coastal Louisiana each day. Commercial fishing in Louisiana is a \$300 million

enterprise annually, and more than 70 percent of it comes from species such as oysters, shrimp and blue crabs that use the coastal wetlands as a nursery for their young. Annually, Louisiana issues an average of 900,000 fishing licenses and 330,000 hunting licenses, and fishing and hunting activities depend on these wetlands as habitat for game species. Additional recreational activities such as boating, camping, hiking, swimming, birding, photography and painting, which are abundant in wetland areas, also are affected by this massive land loss.

Aerial seeding of smooth cordgrass

During the past several years, the LSU AgCenter has conducted extensive aerial planting experiments with a newly developed smooth cordgrass seed called PolyC15. A fixed-wing airplane was used in a Bayou DuPont marsh-creation site near Belle Chase, La., in Plaquemines Parish, and an airboat was used in an aerial seeding at a Lake Pontchartrain site within the Big Branch Marsh National Wildlife Refuge near Lacombe, La. The Bayou DuPont marsh was created by pumping sediment from the Mississippi River about eight miles from the site.

The aerial seeding on the Bayou DuPont site had a limited success because of a rapid dewatering process that was faster than expected and caused the majority of the site to remain dry. Because of the dry soil, most of the seed was displaced onto an upland site by strong winds and did not survive. Only seeds that had fallen into areas

where moisture remained were able to germinate and grow. A large number of these seedlings grew into full plants. The resulting vegetation was patchy and accounted for only about 15 percent of the total area originally seeded. The quality of vegetation varied from robust in the intertidal areas to stunted in higher-elevation areas generally not considered as the natural habitat for smooth cordgrass.

Direct seeding using an airboat in bare soil in the Lake Pontchartrain site, however, produced excellent vegetation composed of very dense smooth cordgrass plants with an average stem density of 11 stems per square foot in less than five months. The seed from this population reached maturity in mid-November 2010.

The latest aerial experiment was conducted on April 25, 2011, using a commercial fixed-wing airplane over 10 acres of newly constructed marsh at the Louisiana Department of Wildlife and Fisheries' Marsh Island Refuge on the coast of Iberia Parish. This 1,159-acre project was part of a federal- and state-funded activity to repair damage from Hurricane Lili on the eastern tip of the island by pumping 3.8 million cubic yards of dredged material from East Cote Blanche Bay. Following the aerial seeding, Marsh Island and the adjacent coastal regions experienced an unusually long period without rain. Healthy and robust smooth cordgrass grew despite the problem.

By the end of September 2011, the overall seeded area was covered by mature smooth cordgrass plants. Dense smooth cordgrass populations grew in



PolyC15 smooth cordgrass seed used in aerial seeding experiments. Photo by Harry Utomo



Seed distribution following aerial seeding over the Bayou DuPont newly created marsh. Photo by Harry Utomo



Seedling growth in the Bayou DuPont newly created marsh site three weeks after aerial seeding. Photo by Harry Utomo

some areas; however, sparse vegetation was also evident, depending on soil elevation relative to water levels and movement. By this time, some plants were already flowering, and in mid-November they produced mature seed. Detailed observations on individual plants revealed that the cordgrass population exhibited high genetic variation, which included plant type, stem color, plant height, leaf stature, leaf size, leaf color, panicle length, panicle size and heading date. The diversity observed correlates well with the DNA fingerprinting data that were used as one of the important criteria in developing high-seed-producing PolyC15 experimental lines used in this project.

In addition to seeding the interior part of the newly constructed marsh, the airplane dropped a swath of seed over the open-water side of the containment dike. It yielded extremely dense cordgrass vegetation with significantly smaller stems. This indicated that seed floated back, landed along the shoreline and ended up growing in a relatively small area. This finding can be further evaluated to increase seed versatility to better adapt under high wave actions. Varying the seed weight with a seed coating could be a key to further improving direct seeding for both high- and low-wave conditions and to enhance planting and placement precision.

Seed supply

Routine direct seeding for coastal restoration will require a steady supply of a large amount of seed that can only be obtained from a production field of seed-producing smooth cordgrass. High seed-producing lines of PolyC15 have been developed through a close collaboration among LSU AgCenter scientists and are in the final stages of development for public release. They are being cultivated at the Rice Research Station and used to produce seed for aerial seeding experiments.

Smooth cordgrass is the predominant species in the intertidal coastal salt marshes with a great adaptation to various salinity levels from freshwater to sea salinity. Its complex root system binds well to banks and shorelines, preventing erosion from tidal action. Because of that, smooth cordgrass typi-

cally is desired for use in brackish and saline habitats.

Developing a method of cultivation and seed production through appropriate fertilization, weed management and mechanical harvest is an involved process being carried out to ensure that upon releasing high-seed-producing smooth cordgrass varieties, the coastal plant industry and coastal restoration community can adopt this innovation. At present, the availability of a sufficient quantity of seed for most Louisiana native wetland species is non-existent. A seed-based smooth cordgrass planting system can be used as a model for developing seed-based planting for other major native species, including California bulrush, seashore paspalum and bitter panicum, that are needed in most coastal restoration projects.

Aerial seeding and hand-transplanting comparison

Aerial planting is a new approach to coastal marsh revegetation technology. Current revegetation efforts are largely conducted through hand-transplanting. Planting vegetative forms generally provides the most reliable establishment of the desired species and accelerates establishment of a diverse native community. Even though the cost of vegetative planting is more expensive than that expected for an aerial seeding application, this method is much less expensive than

building structures for shoreline erosion control and typically is less than 10 percent of the total construction cost of an estimated \$30,000 to \$40,000 for an acre of created marsh. Hand-transplanting, however, is labor-intensive and slow. Transportation can also be challenging because the majority of Louisiana's coastal wetland restoration projects are in remote sites where access is limited to boats and other watercraft. The project sites, especially those in created marshes, are dominated by fluid, low-strength soils that make on-site travel and planting difficult. Precise timing of hand transplanting also can be difficult because of the inability to predict exactly when conditions will be appropriate for planting. As an alternative, aerial planting can now be used.

To date, there has been no reliable commercial seed source of any native wetland species; however, seed-based smooth cordgrass varieties are in the pipeline for commercial seed applications. Such development can pave the way for seed-based releases of other native plants needed to increase species diversity for saline and brackish marshes as well as for intermediate marshes. Requiring only minimum ground activities, aerial seeding can plant hundreds of acres in a single day. This direct seeding will reduce planting costs, minimize labor and increase the speed of restoration. A fixed-wing airplane can reach practically any remote marsh area along the Louisiana coast.

The aerial seeding experiments conducted in the eastern and western coastal plains of Louisiana revealed that direct seeding of smooth cordgrass is a viable approach to revegetating newly constructed coastal marshes rapidly. This could be used as a model for other native species. This technique can easily be combined with other existing restoration tools to achieve specific target goals. When desired, aerial planting of smooth cordgrass can be combined with other planting methods to include other species as needed to promote diversity and produce highly productive ecosystems capable of supporting abundant wildlife. ■

Acknowledgement: This research is partially funded by a U.S. Department of Agriculture Special Grant and Louisiana Sea Grant.



Smooth cordgrass. Photo by John Wozniak

TigerBullets

A newly created wood-plastic product to control lost circulation in oil drilling

Qinglin Wu

Drilling fluids, often referred to as drilling muds in the oil industry, are used in well drilling operations. The drilling fluid – which may be a water-, oil- or synthetic-based formulation – circulates within the well bore, carries cuttings to the surface, lubricates the drilling equipment and acts as a cooling agent. Lost circulation occurs when drilling fluids or muds enter into a porous or fractured formation and are lost to the drilling operation rather than returning to the surface for recycling and reuse. Many drilling hazards such as hole collapse, struck pipe and even blow-out have been the result of lost circulation. Lost circulation costs the industry about \$1 billion per year in the United States alone. Various lost circulation materials have been developed to cure the problem.

TigerBullets, a recently patented composite lost circulation material developed through LSU AgCenter research, is made of a thermoplastic polymer, wood fibers and other additives for reducing lost circulation in drilling wells. The materials are economical and seal fissures and cracks more rapidly and efficiently and at higher temperatures than is typical of most commercially available lost circulation materials. TigerBullets can be mixed with water, aqueous mixtures, aqueous slurries or aqueous muds shortly before being pumped into a well bore as part of the drilling fluid. In the fractured formations, the particles can settle down, absorb water and swell in size while maintaining rigidity. The swelling property (especially from the cellulosic fibers) helps lock the particles into the fractured formation and seal the fractures against drilling fluid leakage. Use of the composite material allows more readily for control of the size distribution of the particles than with mixtures of the individual components. The



product provides a significant value-added option for wood fiber resources in Louisiana.

Engineering TigerBullets

Materials in the formulation include plastic, wood fibers, minerals (e.g., calcium carbonate) and other additives, which are metered and fed to the extruder. The materials go through extensive mixing under heat and pressure to form composite particulates. The extrudates will be quenched in a cold water bath or air-cooled and then pelletized or ground into granules of various sizes. For engineering plastic blends, such as polyethylene terephthalate (PET), targeted for high temperature lost circulation control applications, special extrusion techniques were developed to melt the PET at about 518 degrees Fahrenheit in one extruder and then compound the melt with in-process dried wood fibers from a second extruder at lower temperatures without thermally degrading the fibers.

Strength Properties of TigerBullets

Lost circulations materials need to have sufficient strength to form strong bridges over fractures. The bridges will fail if the material is too weak and undergoes plastic deformation or brittle fracturing under the well-bore pressure. Thus, the maximum sealing pressure of a bridge or a plug is a function of the particles' mechanical properties (e.g.,

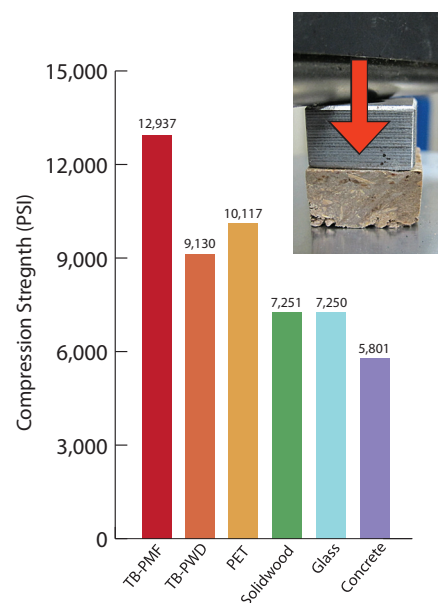


Figure 1. Comparison of compression strength of TigerBullets with other materials.

compression strength) and their sizes and shapes relative to the fracture. The PET-based TigerBullets is formulated with a compression strength stronger than most wood-based material (e.g., mixed nut shells), glass and concrete (Figure 1). Both laboratory and field test data show that these particulates in combination with more flexible materials (e.g., wood fibers) in the formulation form effective plugs for many geographical regions.

Controlling Particle Size Distribution (PSD)

For particulate-based lost circulation materials, particle size distribution (PSD) relative to the fracture aperture,

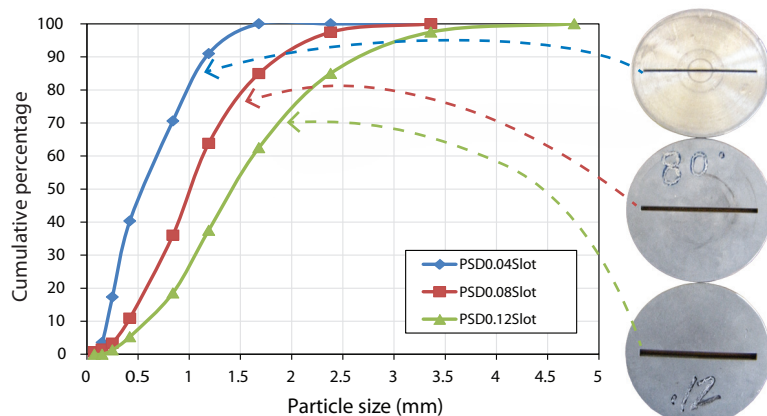


Figure 2. Formed PSDs of TigerBullets for different fracture sizes.

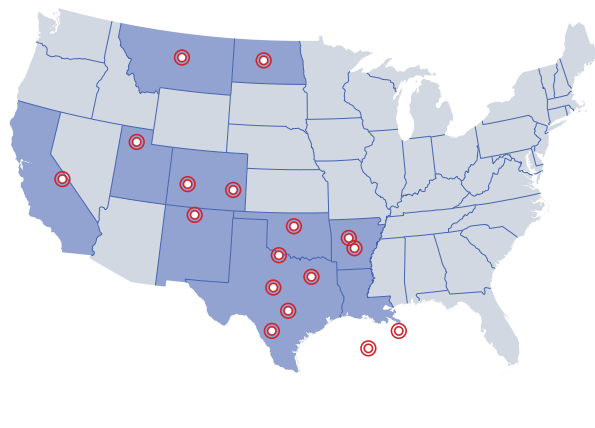


Figure 4. The U.S. locations where TigerBullets have been used.

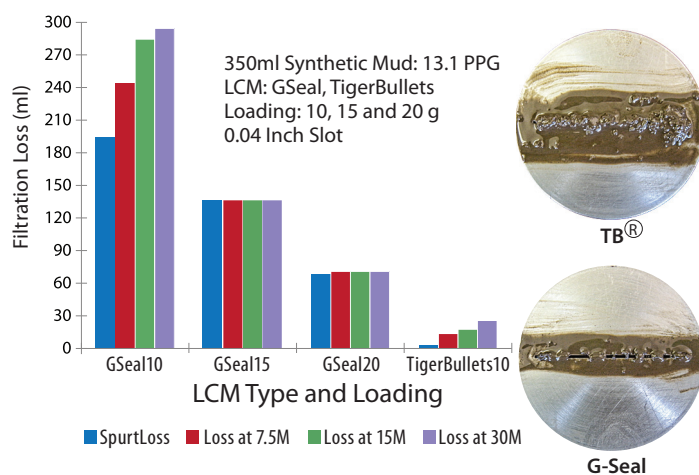


Figure 3. Comparison of filtration loss of TigerBullets and G-Seal with synthetic mud system (G-Seal is a commercial graphite-based lost circulation material).

particle morphology, volumetric concentration and properties of the mud influence whether a seal is established within the fracture or at the fracture openings. TigerBullets are made in various size categories through grinding and screening of the extruded materials. Different particle size distributions are formed by controlling screen size during grinding or by recombining the screened materials for different geological formations. Figure 2 shows three possible PSDs from TigerBullets for three different fracture sizes. The formulation consists of coarse particles to plug or bridge the largest opening in the formation. Medium and fine particles fill the voids between the coarse particles and produce a tight filter cake.

Permeability Plugging Testing (PPT) of TigerBullets

Standard PPTs were performed with water-, synthetic- and oil-based mud systems using single-opening (e.g., 0.04-inch) and multi-opening slot discs. Tests were conducted using 350 milliliters of mud at a given mud viscosity. TigerBullets at target loading levels of 5, 10, 15 or 20 grams were blended into the mud using a variable speed mixer for five minutes. Some basic mud properties as influenced by the added TigerBullets were measured. The mixture was then loaded into a PPT cylinder, and a metal disc with a pre-cut slot was inserted. The

cylinder was then securely sealed with a lid. A differential pressure of 1,000 PSI was established with a hydraulic system and maintained for 30 minutes, from which initial spurt loss and filtration losses at 7.5, 15 and 30 minutes were measured. Replicated test runs demonstrated that TigerBullets had no negative effect on mud properties and provided quick sealing of the fracture at a reduced material loading level by forming strong mud cakes for all three mud systems (Figure 3).

Commercialization and Use of TigerBullets

TigerBullets is manufactured by Wallace Molding and Millwork Inc., in Columbia, La. – a traditional wood products company. The material is marketed by HolePluggers LLC in New Iberia, La., and MI-Swaco Inc. in Houston, Texas (a Schlumberger company). So far, nearly 2,500,000 pounds of the material have been manufactured and sold. The material has been used by some major oil companies including BP, Exxon, Chevron, XTO, Pioneer and OXY in more than 300 oil wells across the United States (Figure 4). International markets are currently being developed.

TigerBullets is designed to seal permeable formations, reduce differential sticking, increase lubricity, and control lost circulation. Additionally, it can be used as a lost circulation material for oil-well cementing operations. TigerBullets can be used as a pretreatment for differential sticking or seepage. It is recommended to add a concentration of 2 to 6 pounds per barrel to the entire drilling fluid system. Sweeps at a concentration of 5 to 15 pounds per barrel can be pumped for seepage while drilling through specific zones. Hourly additions can be made and adjusted if seepage occurs. If lost circulation occurs, pills that contain 20 to 35 pounds per barrel may be used.

TigerBullets uses recycled materials and is predominately biodegradable, partially acid-soluble and nontoxic. It has combined rigidity and visco-elasticity with controlled formulation, strength properties and particle size distributions. It serves the dual functions of lubricant and lost circulation material for minimizing differential sticking. The material is compatible with synthetic-, oil- or water-based drilling fluids with improved field handling and performance. Most importantly, it is based on renewable natural resources in Louisiana. ■

LSU AgCenter serves nursery and landscape industry

Regina P. Bracy

When you mention agriculture to people, they usually don't think of flowers and turf. But the landscape and nursery industry is a vital part of the agricultural economy both in Louisiana and the nation as a whole. In Louisiana, the nursery, greenhouse, landscape, turfgrass and associated industries have experienced unprecedented growth since the 1960s. The industry grew at a rate of 30 percent annually in the 1970s, 20 percent annually in the 1980s, 10 percent annually in the 1990s, and 5 percent annually from 2000-2005. But like much of the rest of the economy, the industry has experienced stagnant growth since then.

Louisiana's nursery and landscape industry contributes more than \$2.2 billion annually to the state's economy, according to the most recent analysis by the LSU AgCenter. The industry employs more than 56,000 individuals and ranks third in the state behind forestry and sugarcane in economic contribution. This segment of agriculture includes production (nursery, greenhouse, cut flowers and sod), horticultural service (landscape architecture, design, installation and maintenance) and retail (independent garden centers and mass merchandisers).

Even with the recent downturn in the economy, market surveys indicate that people continue to garden. The National Gardening Association recently found that 68 percent of all households with a yard or garden, or an estimated 61 million households, anticipated that their involvement in gardening in the next few years would remain the same, and 22 percent said their involvement would increase. Only 10 percent said they would spend less time in lawn, garden and landscape activities.

Home gardeners have a huge appetite

for information. AgCenter parish offices around the state get more daily calls on horticulture than any other topic, and 80 percent of the visitors to the AgCenter's website seek horticulture topics. The AgCenter has 23 Master Gardener programs in 49 parishes, which represent 96 percent of Louisiana's population centers. Master Gardener associations provide financial and volunteer support for many AgCenter programs.

The LSU AgCenter is involved in research and extension activities that provide service and information to nursery, landscape, garden center and turfgrass professionals as well as home gardeners. Examples include the new Louisiana Super Plants program that provides promotion of the best performing ornamental plants. The AgCenter's "Field of Excellence" program provides guidance to improve the condition and quality of high school football fields, many of which are unsafe because of compacted soils, excessive weed pressure and poor turf coverage.

The Hammond Research Station conducts large-scale ornamental plant evaluations – from annual flowers for the cool and warm seasons of the year, to roses, azaleas, crape myrtles, new ground covers, herbaceous perennials and more. The largest herbaceous ornamental plant trial in a multi-state area is conducted annually at the Hammond Station. These multi-year trials are used to introduce and recommend the best varieties and new plants for Louisiana and the Gulf Coast region. Hundreds of visitors (professionals and homeowners) view these evaluations each year.

Landscape horticulture research at the Hammond Station provides information on nutrient management and plant growth regulator use in the landscape and the ability of landscape plants



Regina Bracy, at right in front, is the coordinator of the Hammond Research Station. Photo by Johnny Morgan

to remove (biofilter) nitrogen and phosphorus from runoff water. Research on production management (variety, fertilizer and water) and the use of biopesticides and action thresholds provides growers with ways to more effectively and economically manage the insect thrips in their crops.

Burden Center in Baton Rouge is a longtime fixture for nursery and landscape professionals. The first ornamental horticulture/landscape horticulture field day held by the LSU AgCenter took place there in 1983, and research for commercial horticulture and home gardeners continues. Nursery production research concentrates on efficient use of planting media, irrigation and fertilization. Turfgrass research addresses weed issues, national variety trials and production practice studies. Floriculture studies have included production methods for new crops and an annual poinsettia variety evaluation. The AgCenter also provides plant pathology and entomology support for the industry along with services from the soil testing and plant analysis laboratory.

Service to the nursery and landscape industry in Louisiana is a high priority of the AgCenter. We look forward to contributing to the continuing growth and value of this industry. ■

A new beginning for the Burden Center

Jeff S. Kuehny



Drift roses at the All-America Rose Garden. Photo by Allen Owings

Burden Center is a unique LSU AgCenter facility consisting of 440 acres of green space in the heart of Baton Rouge and conveniently located off Interstate 10. The property was donated by the Burden family to the LSU Agricultural Center and LSU A&M beginning in 1966. The vision stipulated that the property be a “green area” to be enjoyed by the public and that it be used to conduct horticultural and agronomic research and to showcase a Rural Life Museum, formal and informal gardens, and an urban forest.



Burden Center Today

Today, Burden Center comprises many of those elements, which include horticulture and agronomic research, the All-America Rose Garden, the All-America Selections Garden, the Steele Burden Memorial Orangerie, the Ione Burden Conference Center, Burden Woods, Trees and Trails, the Barton Arboretum, the Stone Camellia Collection, Windrush Gardens and the LSU Rural Life Museum.

Burden Center: The Future

A master plan for Burden Center completed in 2009 honors the legacy of the Burden family and provides a unified vision for the future that combines both research and extension activities. The Mission of the Burden Center is to promote the importance of plants and their environment to the physical, mental and spiritual well-being of the citizens of Baton Rouge, the state of Louisiana, and the world. The mission will be accomplished through a three-pronged approach:

- Performing research and facilitating the research of others to develop sustainable plants, landscapes, woodlands and wetlands.
- Educating the community through demonstration of the value of this research by enabling direct public access.
- Bringing people back to nature by providing a diversity of green places and special facilities to engage in conversation, create a community and commune with nature.

Burden Center comprises destinations and points of activity that reflect the past, present and future of agriculture in Louisiana. The LSU Rural Life Museum represents the 18th and 19th century plantation era in Louisiana history while the present and future are represented by the LSU AgCenter's Burden Center.

A new entry road and trail network (Trees and Trails) will tie the site together and create an easily navigated road and trail system for visitors. It will lead to the Botanical Garden, which represents present-day horticulture through its current display and demonstration gardens. Future plans include housing the East Baton Rouge Parish Extension Office, a new conference center, three children's gardens, an Herb and Heritage Garden, a culinary garden and the Louisiana Garden Center, an educational center for local and state horticultural organizations.

The Ornamental and Turf Research Facility will be accessible through the Interstate tunnel and expand its scope to include wetlands research. The woodlands on that side of the property will be

designated as a preserve and will be used for future research in urban forest restoration and education.

From the Botanical Garden the road will continue across an existing bridge and alongside the Food and Fiber Plant Research Facilities, which will continue to support horticultural and agronomic research and expand into greater extension opportunities.

Through the fields and down the oak alley, the road will continue to the LSU Rural Life Museum and historic Windrush Gardens, leading to the Barton Arboretum. Plans include expanding the Barton Arboretum to feature cultivated specimen woody ornamentals.

Trees and Trails, whose trail head is behind the Steele Burden Memorial Orangerie, will continue through Burden Woods, which is home to forestry and environmental research and education activities. This trail system will connect to the Barton Arboretum with a new boardwalk over the Black Swamp, a rain-fed wetland composed of 200-year-old tupelo trees. Additional plans include a connecting trail and boardwalk that will overlook a 10-acre wetland observed from Burdens Bluff and continue along the Wards Creek Meanders.

The Burden Horticulture Society, a friends group, was formed in 2007 to enhance and promote Burden Center for public benefit through educational programs, fundraising and volunteerism. The East Baton Rouge Master Gardeners, Baton Rouge Camellia Society, Baton Rouge Herb Society and Baton Rouge Bonsai Society all help support various outreach opportunities at Burden Center. Through the support of these organizations, the LSU AgCenter, the Burden Foundation and the LSU Foundation, Burden Center is moving forward with a capital campaign, "A Destination for Generations," to provide funding to continue to enhance this unique facility. For more information contact Gigi Gauthier at 225-763-3990. ■

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Trees and Trails. Photo by John Wozniak



Horticulture and agronomic research. Photo by Johnny Morgan



Community Arbor day event. Photo by Johnny Morgan

Field of Excellence: Turfgrass matters in sports

Ron Strahan and Jeff Beasley

Friday nights in the fall find football stadiums filled with excited fans cheering on their local heroes. Few things unite communities like the local high school football team. Louisiana high school football has great tradition, and it's played at an extremely high level. Unfortunately, the football fields don't always match the quality of the athletes on the field. After working several years with high school coaches and field managers, it became obvious that many Louisiana high school football fields were in deplorable shape causing unsafe playing conditions that can lead to potentially serious head and spinal injuries. These poor field conditions included severely compacted soils, excessive weeds, uneven surfaces and overall poor turf coverage. To address these problems, the LSU AgCenter Field of Excellence program was initiated in 2010 and made available to selected high schools across the state. The goal of the program was to provide guidance to improve the condition and overall quality of the participating high school's football field.



Vermilion Catholic schools in Abbeville participated in the Field of Excellence program in 2010. County agent Stuart Gauthier helped guide their improvements. Photo by Steven Trahan, field manager



Field manager Snook Sorrel displays a Field of Excellence banner and sign at New Iberia's Porter Stadium. Photo by Ron Strahan

In 2010, LSU AgCenter experts and parish agents worked with six schools, and in 2011, five schools completed the program. Schools that participate in the Field of Excellence program receive visits from AgCenter experts usually every two to three weeks throughout the spring and summer growing season to assess the field. Recommendations are made to improve the overall agronomic conditions such as fertility and weed management. Practices such as core aeration are implemented to reduce dangerous soil compaction problems that can potentially cause serious injuries. Following the AgCenter recommendations dramatically improves the aesthetic appearance of the fields and allows them to recover from excessive use. The program begins in late winter and ends after the final home game.

Most football fields are improved when turf managers follow simple agronomic practices. However, some fields need more than just improved agronomic practices to get them in playing shape. For example, the program assisted Winnfield High School with its complete renovation in 2010. By the following year, the field was so improved that the Louisiana Turfgrass Association named Winnfield High School as its 2011 High School Football Field of the Year, and the school received a \$500 award for field maintenance. In 2011, the LSU AgCenter Field of Excellence Program assisted Vidalia High School in the complete renovation of its field.

High schools that follow the LSU AgCenter recommendations and implement the best management practices are certified as an LSU AgCenter Field of

Ron Strahan, Associate Professor, and Jeff Beasley, Associate Professor, Department of Soil, Plant & Environmental Sciences, LSU AgCenter, Baton Rouge, La.

Excellence before the beginning of the football season. The schools receive a banner and sign to display near the field that indicate the school has participated and achieved Field of Excellence status. Additionally, the schools are required to make a public address announcement at each game signifying that the football field is an LSU AgCenter Field of Excellence under the direction of the participating county agent.

The Field of Excellence program has allowed the LSU AgCenter to reach new audiences and has improved the overall appearance and the safety and playability of the football fields. Requirements for participation in the program include the following:

- Commitment to follow through with the recommendations of the LSU AgCenter.
- Funding to pay for fertilizers, chemicals, etc. needed to maintain the field.
- Access to pesticide application equipment such as sprayers and spreaders.
- Commitment to correctly apply fertilizers and herbicides when recommended.
- Access to core or spike aerifiers to relieve soil compaction periodically during the growing season.
- Ability to irrigate the field.

2010 schools and agents:

New Roads schools, Pointe Coupee Parish,
Miles Brashier

Ferriday High School, Concordia Parish,
Glen Daniels

Ville Platte High School, Evangeline Parish,
Keith Fontenot

Bastrop High School, Morehouse Parish,
Richard Letlow

Abbeville High and Vermilion Catholic, Vermilion Parish,
Stuart Gauthier

2011 schools and agents:

Wossman High School, Ouachita Parish,
Richard Letlow

Vidalia High School, Concordia Parish,
Nan Huff and Dennis Burns

Winnfield High School, Winn Parish,
Donny Moon

Franklinton High School, Washington Parish,
Henry Harrison

New Iberia high schools, Iberia Parish,
Blair Hebert and Chris Robicheaux



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LOUISIANA DEPARTMENT OF AGRICULTURE AND FORESTRY | MIKE STRAIN DVM, COMMISSIONER

Field of Excellence and Les Miles

Ron Strahan, LSU AgCenter turfgrass specialist, had the idea to ask Les Miles, coach of the LSU Tigers football team, for an endorsement of Louisiana-grown turfgrass after national sportscasters observed Miles chewing grass at football games and the coach admitted, jokingly, in a television interview that “the grass in Tiger Stadium tasted best.” The Louisiana turfgrass growers were being undercut by producers in other states, who were selling their turfgrass cheaper as they converted their acres into other, more profitable crops. To everyone’s delight, Miles agreed to let his image be used for a year, starting in September 2011, to promote Louisiana-grown turfgrass. The turfgrass promotion, which has included posters, ads and billboards with Miles’ photo, has been effective with sales in the fall of 2011 up and expected to continue climbing through the spring of 2012. The Louisiana Grown Turfgrass campaign is funded through the Specialty Crop Program, which is administered by the Louisiana Department of Agriculture and Forestry. The promotion has also brought attention to the LSU AgCenter’s Field of Excellence program made available for high school football fields across the state. In this program the state turfgrass specialist and local county agents work with the schools and their grounds maintenance staff to make their fields safer for players through proper management of the turfgrass. So far, 11 schools have participated in the program.

■ **Linda Foster Benedict**

Watch out for new ornamental plant and lawn diseases

Donald M. Ferrin

The introduction into Louisiana of new plants produced in other regions provides an opportunity not only for the introduction of new diseases, but also new hosts for pathogens already in Louisiana. Furthermore, ever-changing weather patterns continue to influence the occurrence of endemic diseases of ornamentals and lawn grasses across the state. For instance, Louisiana experienced an unusually large number of cases of large patch (also referred to as brown patch), caused by the fungus *Rhizoctonia solani*, in home lawns during the extremely wet weather in July 2011, even though it was much warmer than usually associated with this disease.

Following are a few noteworthy developments of ornamental plant diseases:

A new bacterial leaf spot disease of Knock Out and Double Knock Out roses has been reported from Florida, but it has not yet been observed in Louisiana. The pathogen involved is a new strain of *Xanthomonas*, which is also pathogenic on Indian hawthorn. It is a problem on roses primarily during propagation and nursery production where the plants are subjected to overhead watering that promotes the spread of the bacterium and subsequent disease development. Symptoms include small black lesions with well-defined margins that are often delimited by the leaf veins. These lesions are generally found along the margins of the leaves. The control of bacterial diseases still relies primarily on the use of copper-based fungicides. Identifying and testing potential new products for their control continues to be a high priority of the national IR-4 Project, which is funded through

the U.S. Department of Agriculture and based at Rutgers University in New Jersey. The project's goal is to facilitate the registration of needed pest management technology for specialty crops, including horticultural crops.

Downy mildew of impatiens, caused by the fungal-like pathogen *Plasmopara obducens*, has been observed sporadically in the northeastern and north central United States since 2004 and could make an appearance in Louisiana at any time. This disease develops during periods of cool, wet weather and is primarily restricted to the foliage. Initial symptoms are the yellowing of infected leaves, which eventually drop off leaving only bare stems. The grayish-white growth of the pathogen that is found on the lower surface of affected leaves is a good diagnostic feature. Should you suspect that you have downy mildew on your impatiens, please send samples to the LSU AgCenter Plant Diagnostic Center for confirmation. (See box at right.)

Fusarium wilt of Canary Island date palms has been found in several locations in New Orleans. This disease is caused by the fungus *Fusarium oxysporum* f. sp. *canariensis* and is almost always fatal. It may have been introduced into the state when previously infected palms were brought in and installed in landscape plantings. Once established, the pathogen is then spread from infected to healthy trees during regular pruning to maintain the classic pineapple shape of the crown.

Armillaria root rot, caused by the fungus *Armillaria tabescens*, has recently been implicated in the decline of older plantings of landscape roses in Louisiana. Like other species of *Armillaria*, this pathogen is normally

associated with hardwood forests and is found in urban landscapes where previously wooded areas have been cleared for development. It is also commonly associated with the roots of oak trees from which it may spread to other more susceptible hosts, such as roses. Little can be done to control this disease once it becomes evident and no fungicides are available for its control. One management practice that may help is to avoid irrigating and mulching around the base of the plants as the moisture favors pathogen growth. Instead, soil and mulch should be removed from the area of the root collar to promote drying, which helps to prevent further growth of the pathogen. ■

Submit diseased plants to the Plant Diagnostic Center

The Plant Diagnostic Center on the LSU AgCenter's Baton Rouge campus is a one-stop shop for all plant health problems, which can be caused by pathogens, nematodes, insects and mites as well as by environmental conditions and weed pressures. Misdiagnosis of these problems may add to losses, increase cost and decrease profits. Services include disease diagnosis, insect and mite diagnosis and identification, nematode diagnosis and identification, and weed identification. Solving problems requires accurate information about the problem, including a detailed description of the symptoms and how they developed. A fresh sample of the problem plant – including healthy and damaged tissue – is a must so it is best to hand-deliver. You can also send digital images. Find the details of how to submit at www.lsuagcenter.com/plantdiagnostics

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Chilli thrips threaten Louisiana Knock Out roses

Dennis Ring

Thrips are insects belonging to the order Thysanoptera, meaning fringe-winged insects. One common name is thunderflies because large numbers migrate before thunderstorms. Thrips is a unique word because it is both singular and plural. These tiny insects are elongate, cylindrical and 1/25 to 1/8 of an inch in length. The nymphs are pale-yellow and highly active. The adults are usually black or yellow-brown and may have red, black or white markings. Thrips jump when disturbed. The adults may be winged or wingless. Wings when present are long, narrow, strap-like and fringed with hairs. There are about 264 species in the United States and Canada that feed on plants. Many other species are predaceous. Parthenogenesis (reproduction without mating) occurs in many species. Male thrips are usually smaller than the females.

The Chilli thrips, *Scirtothrips dorsalis* (Hood), is native to southern Asia and was first detected in the United States in 2005 on roses in Florida. In 2007, it was discovered on roses in Houston, and in 2009, it was found on Knock Out roses in New Orleans. This thrips feeds on more than 150 species of plants belonging to more than 40 plant families. Economic losses from this introduced pest have been estimated to be from



Chilli thrips. Photo by Andrew Derksen, FDACS/DPI, Bugwood.org

\$3 billion to \$6 billion annually in the United States. Chilli thrips are predicted to expand their range to parts of the United States where temperatures do not reach or go below 25 degrees Fahrenheit for five consecutive days each year. Twelve to 16 generations per year are expected in Louisiana.

The life cycle from egg to adult is completed in 12 to 22 days depending on the plant species attacked and the temperature. Eggs are laid in the tissue of plants near floral structures, leaf veins and terminal plant parts. Larvae (nymphs) emerge from eggs in six to eight days when temperatures are optimal. They feed on tender young plant

parts. The next stage is the prepupal stage, and it lasts up to one day. The thrips then pupates on the plant or in the soil near the base of the plant. This stage lasts two to three days. Females lay from 60 to 200 eggs during their life. Adults are pale and have dark wings. Young Chilli thrips are pale. These thrips feed on several plant tissues. Feeding causes bronzing, curled leaves, distorted leaves, leaf drop, dwarfed and stunted plants, and bud shed.

To aid in detecting thrips, place a sheet of white typing paper beneath the leaves or flowers and shake the plant. The thrips will fall onto the paper and can be more easily observed and identified than when on the plant. Also look for the small spots of varnish-like excrement on the leaves. Use a 10X to 15X hand lens. Sticky traps, both blue and yellow, can aid in monitoring thrips. Blue sticky traps appear somewhat more effective than yellow. Both of these traps can be purchased through online horticultural sources.

Management programs for this insect are in the process of being developed. Foliar applications of acephate, imidacloprid or spinosad have been effective. Pyrethroids have been less effective. The thrips are on new foliage, and this foliage must be treated. Conserving natural enemies and rotating classes of insecticides is recommended.

One of the main concerns in Louisiana about Chilli thrips is the threat to Knock Out roses, which have few pests attacking them. Chilli thrips may cause severe injury to these roses, which are prevalent in the state. Thus, sampling for the Chilli thrips on Knock Out roses is needed. Older rose varieties require frequent applications of insecticides, and this spraying will manage the Chilli thrips. ■



Knock Out roses. Photo by Mark Claesgens

Dennis Ring, Professor, Department of Entomology, LSU AgCenter, Baton Rouge, La.

Biocontainers

provide sustainability in greenhouse industry

Jeff S. Kuehny, Mike Evans and Matt Taylor

Biocontainers provide the ornamental plant industry with an opportunity to improve the level of adoption of sustainable products and practices. However, many factors must be considered before using these containers for ornamental production and transplanting into the landscape.

Most containerized ornamental crops are commonly grown in plastic containers, which present a significant disposal issue for the horticulture industry as well as for consumers and landscapers. Biocontainers are an alternative to plastic. They generally are made from a variety of organic components that decompose when placed in a composting facility or planted in the soil. One group of biocontainers decomposes slowly or is designed to be removed before planting and composted. The second group is designed to be planted directly into the landscape or the final container and decomposes quickly.

Some of the concerns with biocontainers are that the strength and rigidity vary. Strength is important because containers that tear or break during handling and shipping result in the loss of saleable product. Water use is an important property of biocontainers because some allow more or less water to evaporate from the surface walls of the container. Finally, the ability of transplantable containers to decompose in the soil is important to landscape establishment.

Limited research has been conducted on these properties of biocontainers, and thus a comprehensive study using a wide variety of biodegradable containers to test performance in greenhouse production and in the landscape was conducted at three locations: the LSU AgCenter

Burden Center in Baton Rouge, La., the University of Arkansas in Fayetteville, Ark., and Longwood Gardens in Kennett Square, Penn.

Eight biocontainers and two typical plastic containers were tested for physical characteristics, as well as their effect on plant growth and development during greenhouse production and in the landscape. The biocontainers produced solely for production included:

- Kord Fiber Grow pots manufactured from recycled paper or cardboard.
- Rice hull pots formed using rice hulls.
- OP47 Bio Pot manufactured from 100 percent renewable resources and designed to be completely biodegradable and compostable.

The plantable biocontainers included:

- Jiffypot manufactured from a combination of sphagnum peat, wood pulp fiber and lime to adjust the pH.
- Fertipot (or DOT Pot) composed of spruce fibers and peat with no glue or binders and the only container tested that is certified organic.
- Coir (or coco fiber) pots manufactured by using high pressure to bond coconut husk fibers and latex from rubber trees.
- CowPot manufactured using cow manure.
- Straw Pot manufactured from 80 percent rice straw and 20 percent coco fiber sprayed with a natural latex.

Measurements of the physical properties were conducted at the University of Arkansas. For the production-only containers, plastic had the highest wall strength followed by paper containers. Coco fiber and rice hull containers had higher dry strength than OP47, Fertipot, CowPot, Jiffypot and Straw Pot contain-

ers. Wet strength, which is important when shipping live plants, was adequate for all containers except Fertipot, Jiffypot and CowPot. Thus, the containers that do not have to be removed for planting may require a little extra care in production, shipping and handling.

In the second part of this study conducted at Burden Center and Longwood Gardens, the containers were filled with a standard growing substrate, planted with vinca transplants and placed in a greenhouse. During greenhouse production, the plastic, Fertipot and Kord containers produced the largest plants, while Coir containers produced the smallest plants. However, all plants were of marketable quality at finish. Water was poured through each pot, and the accumulated leachates were tested at finish with a pH of approximately 6, which was similar for all containers.

The greatest water loss was from the Jiffypot, Fertipot, Straw Pot and Coir containers followed by CowPot and Kord. Irrigation frequency also was recorded during greenhouse production where similar results were found. When growing plants in these types of plantable containers, one will have to consider increased irrigation frequency in both the greenhouse and retail environments. The least water loss was from the nonplantable rice hull, OP47 and plastic containers.

The third study was conducted in the landscape with vinca from all containers transplanted into the landscape after six weeks of greenhouse growth. After being planted for seven weeks, plants grown in the Fertipot, CowPot, Straw Pot and Kord containers were somewhat larger than plants grown in the other containers. However, plants grown in all

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containers were of acceptable quality. The CowPot had the greatest degradation in the landscape (greater than 45 percent) while the Jiffypot and Straw Pot containers had the next greatest percent degradation at approximately 10 percent. Differences in decomposition rates are likely due to the difference in materials used to make the containers. Those composed of high-cellulose materials, such as CowPots, had higher rates of decomposition than those containing high amounts of lignin or other difficult-to-decompose components such as coco fiber. Additionally, nitrogen in the dairy manure used to produce the CowPot containers may have stimulated the activity of microorganisms and subsequent decomposition rates.

Container strength, biodegradability, water use and greenhouse performance varied among the different types of biocontainers tested. Fertipot, Jiffypot and CowPot containers had wet strengths low enough to make handling difficult and had higher water requirements. These biocontainers, however, were some of the fastest to decompose in the landscape. Depending upon the geographic location, crop, management conditions and post-production handling, different properties would be more or less important.

Greenhouse growers wanting to improve sustainability by switching to biocontainers will need to evaluate which properties are the most significant and choose a biocontainer that best fits their production techniques, resources and end users. In general, all biodegradable containers tested in this study would serve as suitable replacements for petroleum-based plastic containers in the greenhouse and landscape. ■

Acknowledgment: Louisiana Nursery and Landscape Association and the Baton Rouge Landscape Association for support; Jiffy Group International, ITML Horticultural Products Inc., Fertel USA, Summit Plastic Co., Ivy Acres, and CowPots Manufacturing for providing containers; Scotts Co. for providing fertilizer and Sun Gro for providing substrate.

Drift series roses new landscape shrub

Allen D. Owings

The new Drift series roses were created in response to increased demand for smaller, everblooming plants. These roses are from Conard-Pyle/Star Roses, the same company that produces the Knock Out series of low-maintenance landscape roses. See a photo of this rose on page 12.

Drift roses are a cross between full-size groundcover roses and miniatures. From the former they kept toughness, disease resistance and winter hardiness. From the miniatures they inherited size and the repeat-blooming nature. The low spreading habit of Drift roses makes them perfect for small gardens and combination planters.

The first colors available in the series were Coral, Pink, Red and Peach, all of which have been evaluated by the LSU AgCenter at the Hammond Research Station in Hammond and Burden Center in Baton Rouge since 2009. The newest colors are Apricot (double apricot blooms), Sweet (clear pink, double blooms) and Icy (pure white, double blooms).

Studies of Drift roses were conducted in a full-sun landscape trial at both the Burden and the Hammond stations. A table showing results of this study is on the magazine's website at www.LSUAgCenter.com. At both locations, plants were placed in raised rows of silt loam soil about 5 feet apart in a randomized complete block design with each variety having 5 plants replicated in two blocks. Supplemental irrigation was provided via a drip system. Plants were fertilized in early March with 12-6-6 and again in midsummer at the rate of 1.5 pounds of nitrogen per 1,000 square feet.

Pine straw mulch was maintained at a depth of 2 inches. Hand weeding along with spot applications of glyphosate herbicide were used for post-emergent weed control. Pre-emergent weed control was done with

Amaze granular herbicide. Plants were not pruned or pinched nor were dead flowers removed during the first year after planting. Subsequently, plants were pruned by removing 15-20 percent of terminal and side-growth branches in mid-February and early September.

The Pink and Red varieties of Drift roses are the best landscape performers in Louisiana when only visual quality ratings are considered. Blackspot is a less significant problem than *Cercospora* leaf spot fungus on these roses. The amount of disease is low and should not be a major limitation in variety selection. Plants maintain uniform growth habits from one to another.

All six of the evaluated varieties bloom from spring to early frost. Ranging from scarlet red to bright soft peach, they provide the gardener with a span of color. Drift roses have five flower cycles yearly in south Louisiana. The spring bloom in April and the fall bloom in October, as with most other roses, are the peak times for best performance. The late spring to early summer second bloom is also impressive.

Drift roses should be planted in a well-prepared landscape bed receiving full sun. Fall through midspring is a good time to plant. Space individual plants a minimum of 3 feet apart, but 4-5 feet apart is better long-term. The soil pH for roses needs to be between 6.0-6.5.

Drift roses should be fertilized in the spring with a slow-release or timed fertilizer, which releases nutrients to the plant when the plant needs it most. Another application in late summer would help plants bloom better into the fall, especially in new landscape beds where nutrients may be lacking.

Mulching helps to buffer the cycle from wet to dry soil, keeps the feeder roots from drying out and helps to establish roots more quickly. ■

Allen D. Owings, Professor, Hammond Research Station, Hammond, La.

Urban gardening mecca – Hammond Research Station

Regina P. Bracy

The Hammond Research Station serves as a center for horticulture research and extension and provides research-based information to landscape architects, landscape maintenance professionals, arborists, producers and retailers. The station annually hosts hundreds of visitors, including nursery and landscape professionals, Master Gardeners and the gardening public who attend presentations and tour the grounds.

The gardens at Hammond were designed by Neil Odenwald, LSU professor emeritus of horticulture. The gardens were set up to be visual and tactile billboards for various landscape concepts. It was important to duplicate the growing conditions used by homeowners and landscape professionals.

All aspects of the grounds and gardens are set up to provide an educational experience. Highlights of the gardens at the station include:

Southern homestead planting

A two-story Southern house built in the late 1800s is a significant and interesting architectural aspect of the station. This former residence (now the Southeast Region office) is surrounded by “homestead” plants, which duplicate 30- to 50-year-old landscapes found throughout the South. The landscape demonstrates how established plantings can be renewed and complemented with new and fresh additions. Maintenance and care of heritage trees is demonstrated in the 80-plus-year-old Southern magnolia southeast of the house.

Firewise landscaping

A well-designed, fire-defensible landscape is the first step toward reducing risk from wildfires and is critical to the protection of home and property in the wildland-urban interface – the area between unoccupied wooded areas and



Two 100-year-old oaks at the front entrance to the station. These trees are registered with the Live Oak Society. Photo by Igor Kamalov

human development or houses. The landscape surrounding the building demonstrates the concepts of defensible space, proper placement of shrubs and trees, fire-resistant treatment of wood fences and proper selection of fire-resistant plant material.

Phenology garden

Phenology is the study of regularly recurring biological phenomena (such as plant budding) influenced by climate. The phenological events of flowering ornamentals are recorded in this research garden. These “events” will be used to predict insect pest activities that can be used to develop a biological calendar for a more effective and “greener” way to control pests in the landscape.

Crape myrtle collection

Nestled around and behind the phenology garden is a collection of 17 varieties of crape myrtles. Here one can view the significant differences in size and shape of crape myrtle varieties. Growth habits and pest resistance of the varieties are being evaluated.

Evaluation trials – sun garden and shade garden

The Hammond Research Station annually conducts the largest herbaceous ornamental plant trial in Louisiana, Mississippi, Arkansas and Alabama. These multi-year trials are used to introduce and recommend the best varieties and new plants for Louisiana and the Gulf Coast region. Between 500-800 varieties of ornamental shrubs, annuals and perennials are displayed and evaluated year-round in small “island” groupings in a garden setting. This unique garden layout for plant evaluation provides a showcase of plant combinations and garden design as well as evaluations and displays of new introductions in the plant world. Hundreds of visitors view these evaluations each year.

In the sun garden, plant performance is evaluated in full-sun conditions in all the heat and humidity a Louisiana summer can bring. The motto of this area is “Can they take the heat?” Cool-season plants are evaluated during the cooler months of fall and winter. In the shade garden, plant performance is

evaluated under shade provided by an old stand of spruce pine, loblolly pine and oak trees. A special collection in this area includes more than 40 varieties of hosta.

Margie Y. Jenkins Azalea Garden

This garden was established in 2006 to provide a continuing feature to educate people about azaleas and native plants. It is named for Margie Y. Jenkins, a nationally known, local azalea breeder and native-plant collector. The garden currently includes Robin Hill, Encore, Crimson and Southern Indica families of azaleas with more than 50 different species of native trees and shrubs scattered among them.

W.F. "Hody" Wilson Camellia Garden

More than 600 camellia plants from the work of W.F. "Hody" Wilson Jr. can be found nestled under a pine forest on the station. Planted in the early 1940s and 1950s, many of these plants are one-of-a-kind from Wilson's breeding work when he was station superintendent. A Camellia Stroll sponsored by Tangipahoa Master Gardeners is held annually in February.

Care and maintenance area

Research on landscape issues such as weed control, fertilization, pruning and mulching is conducted in this area.

Plant growth regulators are being evaluated as a means to reduce landscape maintenance costs. Research conducted here provides appropriate fertilization guidelines for optimum growth and bloom of plants while reducing over-application and runoff from the landscape. Several plant evaluations in this area include new landscape roses, ground covers and daylilies.

Wetland or rain garden

This garden was installed to demonstrate that rain gardens are not just holes in the landscape but can be attractive and practical additions to a garden. Designed to hold water beneath the soil surface, this rain garden is indistinguishable from other landscape beds in the sun garden except for the use of native plants. Its purpose is to allow stormwater runoff from impervious areas like driveways and compacted lawn areas to soak into the ground rather than flow into drains and waterways.

Rose evaluations

Landscape shrub roses were introduced to the landscape industry about 15 years ago and now account for 50 percent of all modern roses sold. These roses require little to no fungicide application to control black spot, a serious leaf disease of roses. Evaluations of landscape performance and pro-

duction practices on new varieties of landscape shrub roses are conducted each year in the sun garden, care and maintenance area, and a newly established easy-care rose garden. In this new garden, more than 125 rose varieties (new and antique) are grown with minimal care to provide information on maintenance requirements.

Retention pond and constructed wetland

This water feature adds an aesthetic drama to the entry of the station and also serves as a demonstration and research area on how landscape runoff can be reduced and how landscape pollution can be mitigated. The ability of landscape plants to remove (bio-filter) nitrogen and phosphorus from runoff water is being evaluated for recommendation in stormwater mitigation systems. Cages currently located in the pond contain submerged plant species that are being evaluated.

Urban forest

This area includes 32 species of shade trees. Over time, these trees will provide research opportunities in suitability for urban uses and maintenance practices. The use of truly native trees also will be studied and promoted, as will variety evaluations and cultivation requirements of lesser-known native trees and plants.

Heritage live oaks

Two 100-year-old oaks at the front entrance to the station are used to demonstrate how to protect and preserve historic trees. Practices include tree health assessment, mulching, proper pruning and minimizing root damage. These trees are registered with the Live Oak Society.

Future plans included expansion of the Margie Jenkins Azalea Garden to include heat-tolerant rhododendrons and other groups of azalea as well as an extensive collection of Japanese maples. All the camellia varieties released by Hody Wilson will be added to the camellia garden. A demonstration garden detailing how to incorporate fruit plants in the landscape will be designed. ■

Regina P. Bracy, Research Coordinator and Professor, Hammond Research Station, Hammond, La.



Between 500-800 varieties of ornamental shrubs, annuals and perennials are displayed and evaluated in small "island" groupings in a garden setting. Photo by Igor Kamalov

Warm-season landscape plant evaluations at the Hammond Research Station

Allen D. Owings, Regina P. Bracy and Roger Rosendale

Scientists at the Hammond Research Station evaluate ornamental plants for landscape performance under south Louisiana growing conditions. This information is then provided to nursery and landscape professionals as well as home gardeners for use in selecting plants that will help achieve desired results. Evaluations include annual flowers, herbaceous perennials, trees, shrubs, roses, crape myrtles and more. Much of the plant material studied is new to the horticulture industry while other plants may not be new but may never have been evaluated for their performance in south Louisiana. These tests are an attempt to make people aware of older plants that are worthy of being used once again.

New forms of purple fountain grass are now available. We know purple fountain grass, also called *Pennisetum*, from the 1980s, but new foliage types are now available. Fireworks was introduced two years ago and is being widely used and accepted in the industry. It is a red-foliage form. The new green-and-white variegated foliage form is Sky Rocket. The the new variety for 2012, Cherry Sparkler, has purple-and-white variegated foliage. These plants are best treated as annuals across much of the

state. They prefer full sun and need minimum irrigation. Mature height by fall is 48-54 inches.

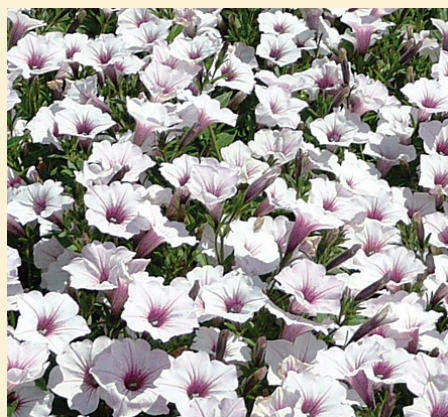
Many new butterfly bushes, also called *Buddleia*, have been available recently, including new dwarf forms that only get 2-3 feet tall, such as the Blue Chip variety from Proven Winners. Growers and landscapers also now have available the Buzz series dwarf varieties Ivory, Lavender, Magenta Improved, Sky Blue and Purple. The Flutterbys from Ball Horticulture with the petite types are very impressive and are better than many of the butterfly bushes previously available. They have good cold hardiness in the southern portion of the state and are considered low maintenance.

The new series of lantanas from Plant Introductions in Georgia are vigorous, mounding and good alternatives to the older, but still popular, New Gold and Silver Mound varieties. The first of the group were Chapel Hill Gold and Chapel Hill Yellow, which have been joined by Sunny Side Up, Miss Tara, Vanilla Ice, Apricot Sunrise and Sunset Orange. These lantanas have unique flower colors and add new interest to this older garden species.

Very late flower production on plants with spectacular foliage colors and shapes is characteristic of the newest varieties in sun-type coleus. Wasabi is the newest, most impressive coleus from Ball FloraPlant. It was developed at the University of Florida. These varieties join the list of other Ball FloraPlant releases – Trusty Rusty, Red Head, Indian Summer, Henna and Mint Mocha. Planted in late March through early May, their foliage color is enhanced in full sun.

Today's purple coneflowers are not like your grandmother's coneflowers. These are called *Echinaceas*. The PowWow series consists of PowWow Wild Berry and PowWow White. Other new purple coneflowers from Darwin Perennials are the Sombrero, Double Scoop and Mistical series. All are being evaluated at the Hammond Research Station for perennial potential, flowering and habit. Winter hardiness is needed in purple coneflowers, and these new varieties may be the answer.

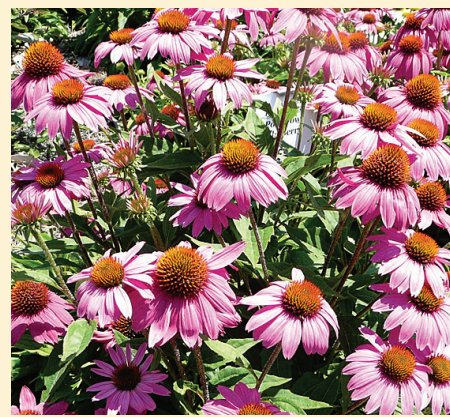
Petunias can be warm-season or cool-season bedding plants in Louisiana. Professionals and home gardeners alike can easily be overwhelmed with so many varieties available.



Supertunia Vista Silverberry petunia



Sunny Side Up lantana



PowWow Wild Berry Echinacea

The Vista Supertunias from Proven Winners continue to be great landscape performers. They finish in June landscapes about 10-14 days before Tidal Wave Silver petunias.

Varieties are Bubblegum, Silverberry and Fuchsia. More petunias performing well in 2011 were the new Suncatcher Pink Lemonade, the Whisper series (six colors) from Syngenta, Sun Spun Blue (new color in the series from Ball FloraPlant), Sangunas (10 colors) from Syngenta, and the Picnic series from Syngenta. Suncatcher Pink Lemonade has high consumer appeal but did not last nearly as long in the landscape. Although most petunias planted in Louisiana are the Wave and Easy Wave varieties, some of these warrant increased use. Plant petunias in fall (October) or early spring (February-March) for best results. They have reasonable cold hardiness and usually last until early June unless they are in shade for growing through summer.

Warm-season All-America Selection winners in the flower and bedding plant categories for 2011 are Arizona Apricot *Gaillardia* and Summer Red Jewel salvia. These have been nice landscape performers. Summer Red Jewel was best in trials at Hammond in 2011 and is a *Salvia coccinea* variety. It is smaller-growing, with less lodging and slightly darker flowers than long-time favorite Lady in Red.

A listing of the best Louisiana performers of the All-America Selection winners in the flower and bedding plant categories for 2010 includes Double Zahara Cherry zinnia, Zahara Starlite Rose zinnia, Double Zahara Fire zinnia, Moonson Deep Orange

marigold, PowWow Wild Berry *Echinacea* and Mesa Yellow *Gaillardia*.

This is just a small sampling of landscape plants that are being evaluated and studied at the LSU AgCenter's Hammond Research Station. Plants are evaluated continually through the warm season of the year. The sun garden at the station, where much of

this research is located, has 450 varieties planted at any one time. And more than 650 varieties are studied from March-November each year. Some plants evaluated have been named Louisiana Super Plants, and additional plant selections for this program are being named as a result of this research. ■

Allen D. Owings, Professor, Regina P. Bracy, Professor and Resident Coordinator, and Roger Rosendale, Research Associate, Hammond Research Station, Hammond, La.

2011 People's Choice Landscape Plant Award Winners from Open Houses and Field Days

Home Gardeners

Gold Winner – **Guardian Blue delphinium**
Silver Winner – **PowWow Wild Berry *Echinacea***
Silver Winner – **Guardian Lavender delphinium**
Bronze Winner – **Suncatcher Pink Lemonade petunia**
Bronze Winner – **Tidal Wave Silver petunia**
Bronze Winner – **Peppermint Schnapps hardy hibiscus**

Master Gardeners

Gold Winner – **Guardian Blue delphinium**
Silver Winner – **Redbor ornamental kale**
Bronze Winner – **PowWow Wild Berry *Echinacea***

Nursery and Landscape Professionals

Gold Winner – **Carefree Celebration rose**
Gold Winner – **Purple muhly grass**
Silver Winner – **Sombrero Salsa Red *Echinacea***
Bronze Winner – **Double Scoop Bubble Gum *Echinacea***
Bronze Winner – **Mesa Bright Bicolor *Gaillardia***
Bronze Winner – **Henry Duelberg salvia**
Bronze Winner – **Belinda's Dream rose**



Redhead coleus



Blue Chip Buddleia



Sky Rocket Pennisetum

Photos by Allen Owings

Using plant growth regulators in the landscape

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

Many shrubs and groundcovers used in the southern landscape require routine pruning or shearing to keep their shape neat and compact. Pruning is a significant expenditure of time and a major labor cost for the landscape service industry. Reducing pruning needs has been the key motivator for the development and use of plant growth regulators (PGRs) in the landscape. In addition, more than half of the states have passed laws prohibiting disposing of yard wastes in landfills, which has increased the interest in using PGRs to reduce pruning or the amount of clippings.

A plant growth regulator is an organic compound, either natural or synthetic, that acts like a hormone and modifies or controls one or more physiological changes within a plant.

For the past 20 years, using PGRs to change plant growth patterns has become a common practice for producing quality horticulture crops, including vegetables, flowers and woody ornamental plants. More recently, the turf and sports industry began using PGRs to enhance turfgrass quality and its ability to tolerate environmental stress. Controlling growth of perennial ground covers and shrubs in the landscape is relatively new, and only a few PGRs are currently registered for this purpose.

Cutless .33G is a new formulation of an old active ingredient, flurprimidol, which acts as an enzyme inhibitor. Before Cutless was available, Atrimmec was the only PGR registered for woody landscape plants. The active ingredient in Atrimmec is dikegulac-sodium, which is absorbed through the leaf. It inhibits cell division and differentiation in the meristem (growing point). Although quick in action, the control effects last for only four to eight weeks.

Cutless is root-absorbed and has a different mode of action from Atrimmec. A 50 percent wettable powder formulation is registered on turfgrass to reduce the need for mowing and to suppress

annual bluegrass. The granular formulation at a low concentration is the first slow-release PGR in its chemical class, and growth control usually lasts for four to six months. In addition, it is relatively safer than a PGR that works on the growing point. Cutless is applied by broadcasting onto the soil surface around the plant, which is easier than spraying leaves or drenching roots as with other PGRs.

The LSU AgCenter Hammond Research Station has been testing this product for its appropriate application rate, timing and duration of control effects on common woody species requiring frequent pruning. Some examples are Asiatic jasmine, azalea, boxwood, Indian hawthorn, Knock Out rose and loropetalum.

Three studies were conducted in landscape research plots from 2008 to 2011. Plants were planted in the fall to allow the establishment of roots during winter and then treated with Cutless in the following spring. Low, medium

and high rates of Cutless were applied immediately after the plants received a light pruning in early spring. In two studies, the plants were treated again in August, without pruning, to control fall growth. Overhead irrigation helped dissolve the active ingredient and facilitate uptake. After spring application, plant size was measured and visual quality was assessed every month for a period of eight to 12 months.

Results indicate that Cutless is effective in controlling growth of ornamental plants that have significant growth in spring or spring and fall. The degree of height reduction varies among species. However, growth control effects were not significant for slow-growing ornamentals such as azalea Sunglow. Control effects on some plants are summarized in Table 1.

Loropetalum: Control effects were significant and long lasting in Merlot Lace. Plants treated with 14 pounds per 1,000 square feet in spring 2007 and again in 2008 remained compact with-



Cutless .33G being broadcast over a research plot at the Hammond Research Station. Photo by Yan Chen

out the need for pruning from 2008 to 2010. This experiment also showed no difference between applying Cutless above or under pine straw mulch. More data are being collected with another popular variety, Zhu Zhou.

Knock Out rose: Height reduction of 35 percent was observed at four weeks after two applications during the first year after establishment at 10 pounds per 1,000 square feet. Two applications of 20 pounds per 1,000 square feet resulted in similar height reduction and visual quality. A single application of either 10 or 20 pounds per 1,000 square feet provided 10 percent to 15 percent height reduction, which was not satisfactory because Knock Out rose is a vigorous plant.

Overall improvement in plant quality was also observed, including increased lateral branching and darker leaf color in treated plants. For example, darker purple leaves on loropetalum and darker green leaves on Knock Out rose were noted and confirmed by a chlorophyll content meter. The control effect has lasted for three months, and more data are being collected for estimating control duration on the popular landscape rose.

Boxwood and Indian hawthorn: Height reductions of 25 percent to 30 percent were observed approximately four weeks after spring application at 10 pounds per 1,000 square feet on plants that were established through winter. Additional applications in the fall did not further affect plant growth.



Cutless .33G applied at 14 pounds per 1,000 square feet in springs 2007 and 2008 effectively controlled loropetalum growth in the landscape from 2008 to 2010. Treated plant (left) compared with the untreated plants (right). Photo by Yan Chen

Asiatic jasmine: Height reduction by 20 percent was observed approximately four weeks after the spring application at 10 pounds per 1,000 square feet. Higher rates at 15 pounds per 1,000 square feet caused some leaf twisting in this plant, although overall visual quality was not affected.

In one study, fertilization was evaluated at various rates with Cutless. Results indicate that using controlled-release fertilizer such as Osmocote 14-14-14 at two pounds of nitrogen per 1,000 square feet will enhance plant

quality compared with plants not fertilized. However, fertilizing at higher rates, for example four pounds of nitrogen per 1,000 square feet, increases plant height by 30 percent, counteracting Cutless and giving unwanted growth.

Effective control on ligustrum, sweet olive, cleyera, eleagnus and hollies has been reported from other trials in the southern region of the country. Improved flowering was also reported for star jasmine, hibiscus and ixora after Cutless application.

The cost of Cutless .33G is around \$5 per pound, which is slightly higher than cost of Atrimmec. Applying Cutless to maintain a 3- to 4-foot-tall loropetalum without pruning for at least one year is around 70 cents.

To get the most from this new PGR, growers and homeowners must be sure to read and follow the label instructions carefully. Application needs to be timed at the active growing stage, which is usually when leaves are sprouting in early spring or when new growth is visible in late summer. It is recommended to prune and treat with Cutless at the same time, and irrigation or rainfall is needed to get the material into root zone after an application. ■

Table 1. Effects of Cutless .33G on some common woody landscape plants.

Species	Rate (pounds per 1,000 square feet)	Application frequency	Height reduction effect compared with untreated (%)
Asiatic jasmine	10	single spring application	20%
Azalea Sunglow	7 to 10	single spring application	Not significant
Japanese boxwood	10	single spring application	25-30%
Indian hawthorn	10	single spring application	25-30%
Knock Out rose	10	single spring application	10-15%
		two applications 2 months apart	35-38%
Loropetalum	14	single spring application	30-35%
		two spring applications in two years	40-50%

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Controlling weeds in flowerbeds

Ron Strahan

Louisianians take pride in the appearance of their landscapes, and weeds detract from this beauty. Along with being aesthetically displeasing, weeds in flower beds compete with desirable plants for water, nutrients and light and soon can get out of control.

Most people rely on back-breaking hand removal to remove weed problems. Hand pulling may be successful for a few weeds, but for most it is only partially effective. Weeds have defense mechanisms that reduce the effectiveness of hand pulling. Annual weeds often break at the stem when pulled, leaving the root or single stem available for potential reestablishment. However, for perennial weeds like purple nutsedge and bermudagrass hand removal is nearly impossible. Perennial weeds have underground structures that are left in the soil after hand removal.

In reality, hand pulling weeds is one of several practices that should be used together for optimum weed control in flowerbeds. These additional practices include the use of mulch, preemergence herbicides and, to a limited extent, postemergence herbicides.

Mulch

Mulch is an extremely important tool for weed management in landscape beds. Mulch acts as a physical barrier to the emerging seedling, and it prevents sunlight from reaching the soil surface. Blocking sunlight is important because some weed seeds such as crabgrass will not germinate without stimulation from sunlight. Also, sunlight is critical for the new weed seedling to begin photosynthesis for growth and development.

Several materials are suitable for mulch including, compost, leaf litter, pine bark, pine mulch and pine straw. Even newspapers can be used as a barrier to weed emergence. Mulches must be thick enough to block light to be effective. As a rule, mulch trees to a depth of 3-4 inches and shrubs to a depth of 2-3 inches. Though mulch is beneficial, it will not hold back most weed infestations. It is important to use mulch

in conjunction with preemergence herbicides.

Preemergence herbicides

Using herbicides for flowerbed weed control can be difficult because of the wide array of high-value ornamental plants grown and their varying tolerances to herbicides. When it comes to herbicide use in flowerbeds, ornamentals are most tolerant of preemergence herbicides.

Preemergence herbicides are weed preventers that are used in most every row crop to supplement a bevy of postemergence herbicide choices. However, these types of herbicides are almost exclusively relied upon for flowerbed weed management and are the backbone of chemical weed control in landscape beds. Preemergence herbicides work by forming a barrier in the upper ½ to 1 inch of the mulch or soil where most seeds germinate and kill weeds as they attempt to emerge.

Because these herbicides have no effect on existing weeds, timing the preemergence herbicide application properly is critical for success. Because they work prior to weed emergence, applications must occur before weed germination. Any existing weeds should be hand removed or carefully spot-treated with a nonselective herbicide prior to treatment. Add water after applying the herbicide. In most cases preemergence herbicides should be applied every 2½ to 3 months. Consult product labels concerning tolerances by desirable plants.

Preemergence herbicides can be effective on several annual weeds including crabgrass, goosegrass, spurges, common purslane and mulberry weed. Most perennial weeds such as purple nutsedge and Florida betony are not controlled with preemergence herbicides.

Postemergence herbicides

It is important to control weeds with mulch and preemergence herbicides because once they have emerged your options become more limited. Few selective postemergence herbicides are

available, especially for broadleaf weeds. There is good news when it comes to selectively controlling most summer grasses like crabgrass and bermudagrass and sedges like purple and yellow nutsedge. Most summer grasses are controlled with herbicides containing the active ingredients fluazifop or sethoxydim. Sedges can be controlled by directed sprays of halosulfuron (Sedgehammer) or sulfosulfuron (Certainty). Additionally, glyphosate can be carefully spot-treated or applied as a wipe for hard-to-control weeds.

Common weeds infesting flowerbeds

Spurge – Several types of spurges are common in landscape beds. Members of the Euphorbaceae (poinsettia) family, spurges are prolific seed-producing annuals that thrive in hot weather. Under optimum growing conditions, plants can go from seed to flower in only three weeks. Some spurges have a more prostrate growth habit that can form dense mats, whereas many spurge species grow more upright. Spurges emit milky latex from broken stems that can be helpful in distinguishing this plant from other species. The plants are difficult to manage in flowerbeds due to heavy seed production and the inability to be successfully removed by hand. Plants often break at the stem during this process, leaving the root and several buds or a single stem available for potential reestablishment.

Control: Most preemergence herbicides work well on spurge. However, the problem usually is in the frequency of



Spurge. Photo by Ron Strahan

the application because spurge control starts failing four to six weeks after application. Professional herbicides that work well include Free Hand (dimethenamid + pendimethalin), Pendulum/PreM and other trade names (pendimethalin), Barricade and Regalkade (proflumicarb), Surflan (oryzalin) and Snapshot (isoxaben + trifluralin). Consumer herbicide options include Preen (dithiopyr or trifluralin) and Amaze (benefin + oryzalin).



Chamberbitter is an extremely invasive summer annual. Photo by Ron Strahan

Chamberbitter (*Phyllanthus urinaria*) – A member of the Euphorbiaceae family, chamberbitter is an extremely invasive summer annual. Chamberbitter resembles hemp sesbania or mimosa seedlings. However, the most distinguishing characteristic is the round seed capsules located on the underside of slender branches. Chamberbitter needs temperatures consistently above 75 degrees; therefore, these plants tend to germinate a little later in the spring than many other flowerbed weeds. Populations of chamberbitter have increased significantly since their introduction from Asia because of their prolific seed production and tolerance of most preemergence herbicides labeled for use in ornamental nurseries.

Control: Light may be necessary to stimulate chamberbitter germination, so thick mulch is helpful in reducing plant populations. Chamberbitter hand pulls very easily, but frequent germination and high populations make hand removal only partially effective. Preemergence herbicides have performed erratically, so using hand removal and mulch in conjunction with herbicides are important to optimize chamberbitter control. Professional herbicides that have activity on chamberbitter include Rout (oxy-

fluorfen + oryzalin), OH2 (oxyfluorfen + pendimethalin), and other oxyfluorfen containing herbicides. Sureguard and Broadstar (flumioxazin) are effective herbicides as well. Most consumer herbicides are weak on chamberbitter. However, Amaze (benefin + oryzalin) provides partial control.

Common bermudagrass – Common bermudagrass is the most widespread grass problem infesting flowerbeds. It is a perennial, warm-season grass originating in Africa that grows well in our Louisiana climate. The grass is widely used for lawns, athletic fields and golf courses, but it is invasive in flowerbeds. Common bermudagrass is characterized by its dark green color, fine texture and the production of rhizomes (below-ground stems) and stolons (above-ground stems) that allow the plant to establish quickly in the landscape.



Common bermudagrass is the most widespread grass problem infesting flowerbeds. Photo by Ron Strahan

Control: Because of its complex stolon and rhizome system, hand removal is not effective for controlling common bermudagrass infestations in landscape beds. Because the weed mainly reproduces vegetatively and creeps into flowerbeds, preemergence herbicides have no effect on the weed either. Frequent applications of grass-killing herbicides like Fusilade and Segment can be effective in managing bermudagrass in landscape beds. These types of herbicides only work on grasses and are usually safe over the top of most nongrass landscape plants such as bedding plants, perennial ground covers and shrubs. Consumer versions of these herbicides include Ortho GrassBGon (fluazifop) and Fertilome Over the Top II (sethoxydim).



Purple nutsedge is the most common weed infesting residential and commercial landscape plantings. Photo by Ron Strahan

Nutsedges – Purple nutsedge ranks as the No. 1 weed problem in the world and is the most common weed infesting residential and commercial landscape plantings. Yellow nutsedge prefers moist environments and is more common in irrigated beds or during wet growing seasons. Both are grass-like plants with an extensive system of tubers that allow the plants to reproduce rapidly in landscape beds.

Control: Nutsedges are difficult to manage consistently in landscape beds. Neither purple nor yellow nutsedge can be controlled by hand removal, and mulches are only slightly effective. Yellow nutsedge can be partially managed with preemergence herbicides with the active ingredients metolachlor (Pennant Magnum) or dimethenamid (Tower and Free Hand). Unfortunately, there are no good preemergence options for purple nutsedge.

Postemergence herbicides Sedgehammer (halosulfuron) and Certainty (sulfosulfuron) are two effective herbicides registered for the selective removal of sedges in landscape beds. In most situations, these herbicides should be applied as directed sprays. Consult product labels for lists of tolerant plants and application techniques. For most situations, the best defense against weed infestations in the flowerbed is reliance on mulch, periodic hand pulling and an aggressive preemergence herbicide program.

Certain weeds prevalent in Louisiana landscapes are almost uncontrollable. These include torpedograss, bushkiller vine and cogongrass. More information about these weeds is on the magazine's website at www.LSUAgCenter.com. ■

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Crop residue biomass production in Louisiana

Hector Zapata, Michael Dicks, David Maradiaga and Huizhen Niu

Ethanol in small quantities is used to supplement gasoline. While corn starch is the primary source of this fuel, research continues on converting a range of plant fibers (cellulose) into ethanol. The LSU AgCenter is a member of the Sun Grant consortium of universities involved with the analysis of the potential for cellulosic ethanol and the development of the technologies to make the conversion of plant fibers to ethanol economically viable. One driver of the ethanol market is the Energy Independence and Security Act of 2007, which requires that 36 billion gallons of renewable fuel be produced in the United States by 2022. Cellulosic biofuels, produced from lignocellulose, will comprise 16 billion gallons (45 percent) of this total.

Louisiana has several sources of plant material available after harvest of major crops that could be used to produce ethanol and electricity. For example, rice hulls have been used in southwest Louisiana to produce electricity, and sugarcane bagasse is used by sugar factories as burning fuel. This study measures the total potential amount of crop material left in fields from the production of Louisiana's main commercial crops – including corn, cotton lint, rice, wheat, grain sorghum, soybeans and sugarcane – and the total potential ethanol and electricity that could result from conversion.

Measuring Total Biomass

Crop residues from agricultural fields have intrinsic value. Corn and soybean residue, for example, increases soil moisture, nutrient and organic matter content of soils while reducing soil erosion. These beneficial functions of crop residues

should be maintained when estimating potential total biomass. Conversion factors for dry matter and available residue for corn stover, for example, are estimated at 30 percent of total residues. Using historical yield data for Louisiana, average straw to grain ratios were multiplied by average yields and by average acres harvested to obtain an estimate of crop residue tonnage for each parish over the past 10 years. Total biomass is converted to Btus per pound by source of feedstock. Corn stover, sorghum straw, wheat straw, soybean and cotton biomass are converted to fuel using 7,500 Btus per pound of dry matter; rice straw is estimated at 6,811 Btus per pound of straw. For sugarcane, energy value (dry matter) was calculated at 7,899.5 Btus per pound and feedstock yield (bagasse) was estimated at 22 percent of a historical yield average. For the conversion of biomass to kilowatt hours, it is assumed that 1 kwh is equivalent to 3,413 Btus at an average efficiency of 20 percent; for liquid ethanol, the conversion factor is 84,000 Btus per gallon.

Potential Ethanol Production

Total biomass production available from crop residues in Louisiana is presented in Figure 1. Bagasse from sugarcane production (for sugar) accounts for 30 percent of total biomass from crop residues using average parish crops yields from 2000-2010. Rice yields have been increasing over the past few decades in Louisiana, although acreage has been on a down-trend since the late 1960s, resulting in 23 percent of the state total biomass potential. Corn acreage and production have grown exponentially, with corn production now concentrated

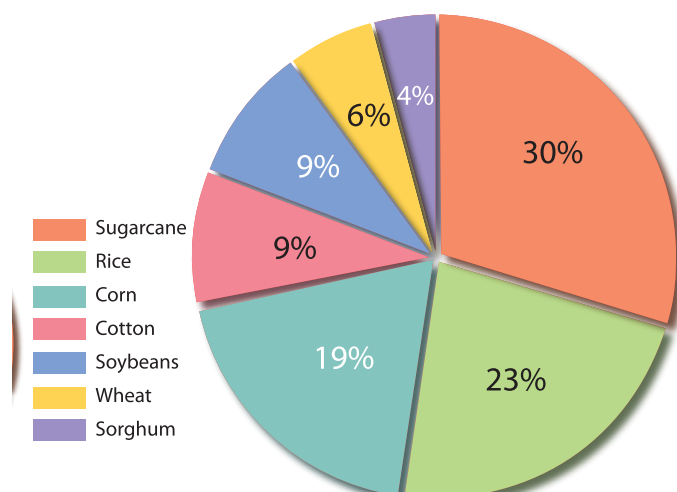


Figure 1. Louisiana available biomass: 40,844 billion Btus

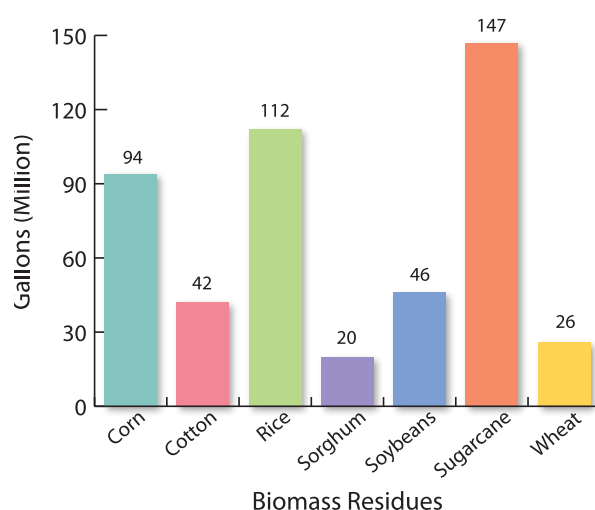


Figure 2. Potential ethanol production from crop residues in Louisiana

in the northeast corner of the state. This increasing trend in corn production makes corn the third (19 percent) dominant crop residue biomass supplier in the state. The remaining feedstocks – cotton, sorghum, soybeans and wheat – supply about 26 percent of total biomass.

The conversion of total biomass into total gallons of ethanol is presented in Figure 2. Again, sugarcane bagasse dominates as a potential source of ethanol resulting in a total production of 147 million gallons, followed by rice straw with 112 million gallons, and corn stover with 94 million gallons. The remaining crops could generate a total of 134 million gallons of ethanol. This suggests that the total state potential ethanol production from crop residues included in this study is about 486 million gallons.

The number of housing units that could be supplied with electricity from crop residues is equivalent to the Btus that can be generated from the various feedstocks divided by 18,000 kwh/year required to power an average home in Louisiana. The resulting estimates are shown in Figure 3. The findings suggest that close to 132,971 homes could be supplied with electricity from crop residues produced in the state, given that the sources of agricultural residue remain in the same proportions as those calculated for ethanol (Figure 2).

The potential economic impact from developing a crop-residue based ethanol industry is significant.

It was assumed for this study that those parishes with maximum biomass production could become primary suppliers as shown in Figure 4. These estimates suggest that parishes in the top 50 percentiles (the two darker green shadings) are located in northeast, south central and southwest Louisiana. A radius of 50 miles from the physical address to Agrilectric Power in Lake Charles, which uses rice hulls to produce electricity, is illustrated for the southwest corner of the state as a point of reference to an existing operation and to a potential supply zone.

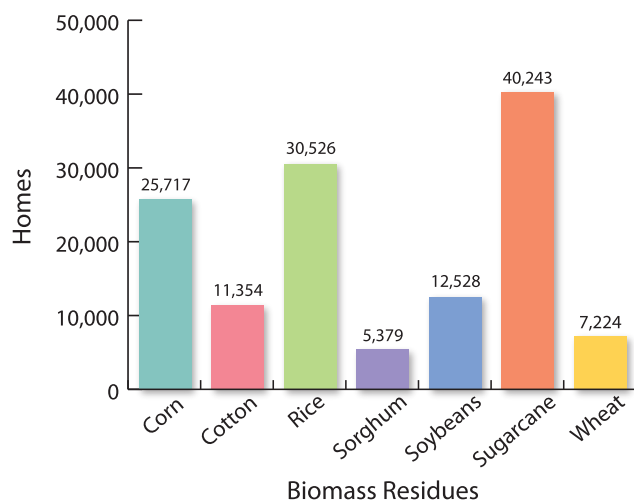


Figure 3 Potential Bio-Power from Crop Residues in Louisiana

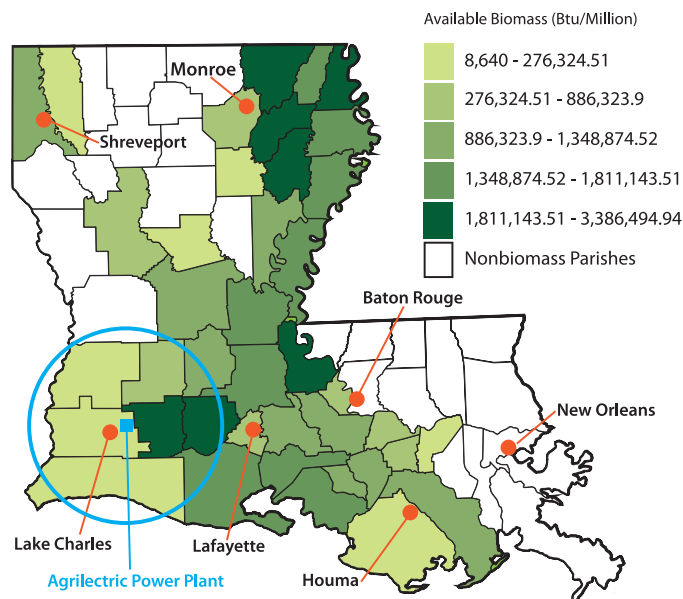


Figure 4. Biomass production from crop residues in Louisiana, 2009.

Conclusions

While the viability of using crop residues for ethanol production is a subject of research and development, estimates of potential production of ethanol and electricity from agricultural crop residues in Louisiana are valuable in planning the development of such an industry. This study shows that potential total biomass production from agricultural crop residues is located mainly in the northeast, southwest and south central areas of the state. These are areas most likely to benefit from crop residue cellulosic ethanol production if commercially viable technologies are developed. The potential economic impact from developing a crop-residue based ethanol industry is significant. The estimates from this study suggest that there is enough biomass from crop residues to provide electricity for about 130,000 homes; this would be the equivalent of supplying sufficient electricity for two large cities such as Baton Rouge and Lake Charles. Equivalently, this biomass potential could be used to develop about 10 ethanol plants, each with a capacity of 50 million gallons per year.

The majority of U.S. ethanol plants are in rural communities where agriculture is the dominant economic activity. Because the economic impact of ethanol production is mostly local, it is an appealing industry because wages in ethanol production tend to be higher than those in many other alternatives. Whether the development of this industry becomes a reality for Louisiana would require a closer examination of the economic feasibility and risks associated with markets, technologies and natural factors. ■

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Autonomous boats offer solutions to environmental tasks

Steven Hall, Daniel Smith, Brian Thompson and Jake Farlow

Automated, solar-powered boats have been used to reduce bird predation on catfish ponds and to track water quality in natural water bodies and drinking water reservoirs. Recent work has focused on using more than one vehicle at a time to more effectively perform agricultural and environmental tasks. Work on communication systems and procedures to coordinate actions of multiple vehicles is an area of current development.

A team of researchers at the LSU AgCenter developed a fleet of autonomous boats originally designed to reduce predatory birds on aquaculture ponds. These devices are modular, solar-powered and GPS-equipped and are controlled by microcontrollers. Dual Styrofoam flotation pontoons connected with an aluminum frame provide a stable base on which to mount solar panels, paddlewheels, electronics and other components.

The solar panels are located on top of the aluminum frame to collect energy during daylight hours and to protect electronics from the sun's heat. Motors with paddlewheels are attached to each pontoon for moving and steering. Each boat is also equipped with batteries for energy storage. Cameras attached to the boats and paired with the microcontroller are capable of spotting predators. All electronics are stored in a large, sealable PVC tube in the boat's center to prevent water damage.

Additional sensors to detect battery voltage and sunlight level allow the boat to turn off at night or during low power periods (such as repeat-

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Left to right are Daryl Savage, visiting scholar from New Tech @ Ruston; Jake Farlow; Steven Hall; and Emile Frey, visiting scholar from New Tech @ Ruston. These solar-powered boats can communicate with each other to perform water quality and aquacultural tasks. Photo by John Wozniak

ed cloudiness). These sensors allow the boat to operate for weeks without maintenance.

At the head of the boat, there are GPS receivers capable of receiving accurate position and time information. The microcontroller can interpret this information to determine the speed and heading of the boat. At the tail of the boat, antennas are capable of communicating with other boats in the area, and the microcontroller can use information sent from other boats coupled with information on the local boat to establish a plan of action. For instance, if one boat detects a flock of birds on the water, Boat A can send a signal to Boats B, C and D. The system can be programmed to make a decision based on the situation so that in this case Boat A “calls for help,” and Boats B and C come to assist Boat A in scaring off birds while Boat D continues to survey another area.

The future of the autonomous fleet of boats could include monitoring environmental quality of air and water from lakes, rivers, aquatic ponds and coastal regions. Use of such devices

may include deployment in difficult-to-access areas to capture environmental, aquacultural, water reservoir or even off-shore data. The vehicles are stable and capture data effectively, and they can be included in a feedback system to provide control, alarm or information to improve water-quality management in coastal areas.

Each boat in the fleet is capable of two types of communication – internal to each boat and external between vehicles in the fleet. Boats are able to complete tasks that have been assigned before deployment and even during deployment, according to the data that have been sent back to a base station. The communication between the boats and a control station plays an integral part of the effectiveness of the fleet. The availability of multiple communication options for transmitting data to the central computer allows systems to be customized to meet individual farmer’s exact needs.

Each boat is equipped with GPS technology that can be programmed so a boat can remain within defined boundaries or be sent to a specific

location. Applications could include mapping, environmental monitoring (spills, gradient tracking, temperature, oxygen level) and the use of biosensors. For instance, a fleet of boats equipped with sensors can be sent into a hazardous spill area to identify conditions where it would be unsafe for humans. The fleet, using internal and external communications, would gather data and send it back to the base station for analysis. Systems can be programmed to send alarms or report site conditions by contacting a computer, telephone, radio or pager.

Many areas of autonomous vehicle development and research offer opportunities. The AgCenter has developed and tested this concept and proved the devices can be highly effective at reducing bird predation on selected aquaculture ponds. They are effective, safe and environmentally friendly. Such devices likely will increase in their usefulness in coming decades, and most of these developments will have beneficial effects on fisheries and aquaculture, if wise management and design are considered. ■



Multiple vehicles can cooperate to perform aquatic tasks. The round black devices floating along the side have GPS and provide location and speed, while antennas on the opposite end can send and receive signals from the other boats. Photo by John Wozniak

Inside:

Aerial application of plant seed on the coast holds promise. See page 6.

A new product developed by AgCenter science prevents lost circulation in oil drilling. See page 9.

The Burden Center in Baton Rouge (page 12) and the Hammond Research Station in Hammond (page 20) provide gardening and landscape advice for both industry and consumers.

The Field of Excellence program helps keep student athletes safer. See page 14.

Scientists evaluate plant growth regulators for use in landscapes. See page 24.

Economists evaluate the profitability of crop waste as a source of power. See page 29.



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