

Louisiana Rice Research Board ANNUAL REPORT

2020

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Checkoff Funds Support Research for Louisiana Rice Farmers

New Provisia variety approved, other lines being tested

A new Provisia line has been approved as variety PVL02.

"It will be available for limited commercial production," said Adam Famoso, LSU AgCenter rice breeder.

Registered seed from two farms was grown in 2019. Famoso said yield results were good.

"It did even better this year compared to previous years," he said. "It consistently had a 10% yield advantage over PVL01."

Further development of Provisia continues. Famoso said seed from four candidate Provisia lines — all sister lines to each other — were sent to Puerto Rico in October for additional purification and increase.

He said the lines have good disease resistance, including the Pita blast resistance gene, good grain appearance and higher yield than PVL02.

2021 is the earliest any of the lines would be released if they continue to show good results, he said.

Two advanced long-grain Clearfield lines were in their final year of testing in 2019. The experimental line LA2097 is being recommend for release, and a decision will be made in the coming months.

"LA2097 has done very well over the last four years of testing, consistently outyielding CLI53," Famoso said.

In 2019 the average yield advantage was 7% across more than 20 tests throughout Louisiana, Arkansas and Texas, Famoso said.

Like CLI53, LA2097 has very good blast resistance, and it has demonstrated good milling qualities. Ten acres of foundation seed was produced in 2019 and commercial seed could be available in 2021.

In most tests, Famoso said, the average yield was very good.

"On average, it outyielded CLI53 by 7%," he said.



TOP RIGHT: A new Provisia variety, PVL02, has been released by the LSU AgCenter for 2020. It has a 10% yield advantage over PVL01. Photo by Karen Bearb. **ABOVE:** Workers harvest and thresh rice from breeding plots at the H. Rouse Caffey Rice Research Station. Photo by Bruce Schultz.

Famoso said 2019 had some challenges, but very good results were obtained from the breeding program's plots at the H. Rouse Caffey Rice Research Station. But the story was different for rice grown off-station.

"It was a tough year at some off-station locations," he said. "A number of our off-station tests had some challenges, ranging from poor stands, drift, bird and hog damage, and heavy disease pressure."

From the Louisiana Rice Research Board



The Louisiana Rice Research Board decides how farmers' checkoff funds will be spent on research to help rice farmers. Board members, left to right, bottom row, are Jerry Leonards, Vice Chairman Dane Hebert, Chairman Richard Fontenot, Secretary and Treasurer John Denison, Damian Bollich and Eric Savant; top row, David LaCour, Jude Doise, Alan Lawson, John Earles, Jeffery Sylvester, Kim Frey, Benjamin Rayburn for the Louisiana Department of Agriculture and Forestry, and Sammy Noel.

Tough times don't last; tough people do

As farmers, we are always faced with challenges, in and out of the field.

This past year, we endured more than our share of hurdles. For most of us, the 2019 crop was one of the most difficult we've encountered with some of the lowest yields in a long time, and we hope it won't be repeated.

We knew by midseason that our crop would be facing challenges with continuously wet conditions, disease and a tropical weather event at a critical time for the crop. Conditions were prime for diminishing our crop production opportunity.

After Hurricane Barry, most fields appeared to have been left unscathed. A minimal amount of lodging could be found. But as the season progressed, we realized the storm caused damage that wasn't obvious. Lodging wasn't widespread because panicles were either blank or slow to develop. And the moisture brought by Barry only added to the disease incursion that plagued the mature crop all the way to harvest.

Looking forward, prices have made some recovery, so there is room for optimism as we prepare for the 2020 crop.

As the saying goes, "Tough times don't last. Tough people do."

There were positive developments in 2019. They included the first U.S. rice sale to China, which

could lead to more sales in the future and would be a huge boost to the industry. Significant sales to Iraq were also made, and the industry hopes that will continue for years to come.

A price increase for rice in the fall was welcome relief, but it was the result of low crop production that eliminated a large portion of the 2019 crop carryover.

Even though times have been difficult, now is not the time to stop investing in our rice industry's future. For our industry to survive, we must become more efficient and productive, and advances through research programs are the most viable ways to achieve that goal.

Your Louisiana Rice Research Board has made both short- and long-term plans and investments to ensure the state's rice industry will have the benefit of timely research to keep the industry sustainable. We must continue our investment to maintain the momentum and industry-leading research we have set forth over the years at the LSU AgCenter H. Rouse Caffey Rice Research Station.

Last year, the Louisiana Rice Research Board set aside \$2 million in Colombian Free Trade Agreement money for an academic chair for the LSU AgCenter H. Rouse Caffey Rice Research Station. Interest generated by the account will be used to fund an endowed chair position to

enhance efforts at the rice station with a stable funding source for perpetuity. The principal can never be touched.

Money from the Colombian Free Trade Agreement also has been invested in the rice research station infrastructure with a new milling facility, an emergency generator, additional office space at the administrative building, and updates to laboratory and greenhouse facilities. Your board has also used these funds to enhance support of additional research projects that could not have been funded with only checkoff funds.

These improvements and project support will ensure that the research facility not only is a state-of-the-art facility with the infrastructure capable of handling future needs, but it is also capable of identifying and solving industry needs in a timely manner.

The board continues to use your checkoff dollars to fund applied research projects that will ultimately help us improve our farming practices. This responsibility is not taken lightly, and I invite all of you to attend any of our meetings as well as your annual field day to identify what needs we can address to make our industry more viable and sustainable for years to come.

Thanks for all your support, and God bless.

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A combine harvests a field near Eunice. Most farmers were disappointed with yields from their crops that suffered from wet and cool weather in the beginning of the season, followed by a hurricane, that probably reduced the crop's potential.

Farmers say 'good riddance' to 2019

Most farmers would probably like to forget 2019.

"There's really not anything good to say about this year's rice crop," said Dustin Harrell, LSU AgCenter rice extension specialist.

Storms, excessive heat and humidity and high levels of disease all resulted in low yields, low milling and quality problems, he said.

Weather cooperated after the late summer harvest with a drought that allowed farmers to do field work that couldn't be done in the fall of 2018 because of heavy rains, Harrell said.

Harrell is expecting rice acreage in Louisiana to remain about the same in 2020.

The 2019 crop in Louisiana was grown on 415,000 acres, down from 434,000 in 2018. Long-grain acreage made up 88% of the crop, with the rest in medium grain.

Calcasieu Parish showed a big loss, and it fell from the top 10 rice-growing parishes, going from 11,844 acres in 2018 to 8,238 in 2019. Franklin Parish rice acreage more than doubled with the biggest gain, going from 4,705 in 2018 to 10,428. Morehouse Parish gained more than 4,000 acres.

Don Groth, LSU AgCenter plant pathologist, said disease problems plagued farmers. Fungal diseases thrived in south Louisiana because of unusually wet weather, he said.

Kernel smut and false smut were found throughout south Louisiana, including the H. Rouse Caffey Rice Research Station.

"I have never seen smut here that early before," Groth said.

Typically, smuts are more common in north Louisiana. He said yields were probably off by 15% from last year.

"We had some locations where it was more than that," Groth said. "Overall, it was a tough year from the start."

He said hybrids tend to be more susceptible to smuts. Fields can be treated effectively with propiconazole fungicides such as Tilt when applied at early boot, Groth said.



Dr. Don Groth, LSU AgCenter plant pathologist, looks for disease on research plots at the Rice Research Station. Farmers reported a considerable amount of disease in their rice crop in 2019 including smuts.

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Satellite imagery may help farmers make crop management decisions

Luciano Shiratsuchi, LSU AgCenter precision agriculture state specialist, is working on a project that will help farmers use satellite imagery products from their fields to make better crop management decisions.

“My work specifically with rice is to create a network of ground control points to support consultants and users of satellite imagery,” Shiratsuchi said.

The satellite images must be calibrated with data gathered from fields. Without calibration, he said, the satellite images are meaningless. “When you calibrate, you can use the data to create several consistent zones,” he said.

He worked in 2019 to collect data from ground sensors on six rice farms and at the H. Rouse Caffey Rice Research Station, but next year he will use two

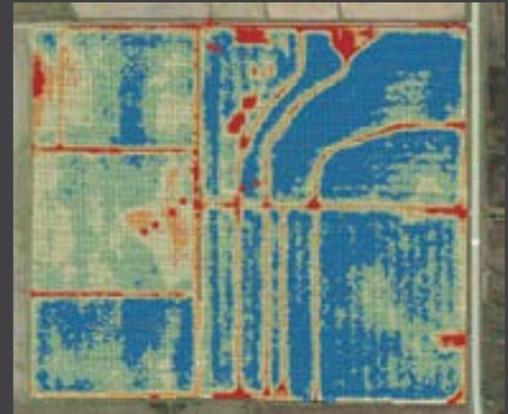
drones and high-clearance ground rigs to provide considerably more data in a shorter time frame.

“We will be able to do 500 data points quickly, but this year it took eight hours to take data from 10 points,” he said.

He said a master’s degree student will work on the project in 2020.

With calibration, the satellite image products can reveal a leaf area index to support pesticide applications, growth of plants and plant height throughout a field.

Ultimately, he said, farmers should be able to use the information to predict yields and make yield maps for those that don’t have yield monitors with GPS. That could help a farmer decide whether to invest more time and money in a field, Shiratsuchi said, and it will allow for earlier crop marketing decisions.



A satellite image that shows plant height from a rice field. Dr. Luciano Shiratsuchi is working to calibrate ground-based remote sensing data with satellite imagery to provide detailed information to help farmers predict yields.

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Groth said fungicides didn’t work as well against sheath blight as in previous years.

Jeremy Hebert, LSU AgCenter county agent in Acadia Parish, said the 2019 crop disappointed most farmers.

“It kicked them while they were down,” he said.

But he doesn’t expect farmers will make many changes for the 2020 crop, with many farmers planning to plant the same acreage.

He said wind from Hurricane Barry interfered with the progression of the crop, coming at the time of flowering for most fields.

“You couldn’t have picked a better time to come in and do some damage,” he said.

Acadia Parish yields averaged 40 to 41 barrels or 145 to 148 bushels, he said, compared to the 2018 average in Acadia Parish of 46 barrels (165 bushels).

Hebert said farmers cutting a second crop were averaging 10 to 17 barrels, and there were reports of totals exceeding 20 barrels (72 bushels).

Allen Lawson, an Acadia Parish farmer, said the year was frustrating but his yields were only down less than 10%.

“I’m ready for this one to be in the books,” Lawson said.

Lawson said his average last year was 44 barrels, or 160 bushels, and this year he had a 39-barrel average (140 bushels). He said he reduced his second-crop acreage because not all his fields were in shape for a ratoon crop.

“I know several people told me they pumped water on their fields for a second crop and fertilized it, and they’re not even cutting it because it didn’t make,” Lawson said.

Lawson’s best-yielding field, planted with a hybrid, didn’t get seeded until late May, so it missed damage from Hurricane Barry. Smut disease turned his combine black, and in fields to be used for crawfish, stink bugs caused significant damage.

He said he used Provisia rice in a field with a bad outcrossing problem, and it yielded about 35 barrels, or 126 bushels.

Todd Fontenot, LSU AgCenter county agent in Evangeline Parish, said farmers faced wet weather from the beginning of the season.

“The weather was really a big factor,” Fontenot said. “It was wet for so long, and there was not a lot of sunlight.”

Fontenot said Evangeline Parish acreage will probably be about the same in 2020.

He said disease pressure became obvious at harvest, including smuts and sheath blight.

Andrew Granger, LSU AgCenter county agent in Vermilion Parish, said 2019 “was subpar for almost everybody.”

“We had too much rain at the wrong time, and you couldn’t get the land right before planting,” he said.

An 11-inch rain in June came at the worst time, he said, along with Hurricane Barry in mid-July.

Granger estimated yields averaged in the mid-30 barrels (120 to 140 bushel range), 20% less than 2018. Initial reports of second-crop harvests put yields around 10 to 15 barrels, 36 to 52 bushels.

Granger said acreage in Vermilion will probably be stable.

“I was surprised this year’s acreage (48,000) was up a couple thousand acres from last year,” he said.

Keith Collins, LSU AgCenter county agent in Richland Parish, said the northeast Louisiana rice crop was about average. He said the hot, dry weather July through September probably stressed the rice.

“Even hybrids didn’t seem to tiller as well,” he said.

Although the recommended planting window is April 10 through May 10, many weren’t able to plant until late May and even June, he said, because fields were too wet to plant earlier.

He said row rice jumped to 15,500 acres in 2019, double the 2018 total, and most of that was in Morehouse Parish.

Collins said rice acreage will be affected by soybean prices. Rice acreage will remain the same if soybean prices remain low, he said, but an uptick could cause farmers to shift to soybeans.

Scott Franklin, chairman of the Northeast Louisiana Rice Growers Association, said he expects northeast Louisiana rice acreage to increase next year if soybean prices remain in the \$9 range. Farmers in the area are likely to use the row rice practice since it has become insurable, he said.

He said yields in his area were down by as much as 25% in some cases, which he blamed on the weather, especially rainy spring weather that prevented farmers from planting on time.

Farmers who couldn’t plant until the last of May or later had poor yields, he said, but more acreage, perhaps as much as 15,000 to 20,000 acres, would have been planted if land hadn’t been submerged by backwater flooding.

Jimmy Meaux, LSU AgCenter county agent in Jefferson Davis, Cameron and Calcasieu parishes, said his area was no different than others this year for disappointing results.

“It seemed like everybody I talked to was down by 15% from their yields last year,” he said.

He said yields average in the upper 30-barrel (110-bushel) range.

Rains interfered with harvest, he said, and rain earlier in the season caused problems with planting, weed control and fertilizer applications.

“It was a horrible year,” said Mark Zaunbrecher, who retired in 2019 as the farmer in charge of growing rice, soybeans and forage for Sweet Lake Farm Partners in Calcasieu Parish.

He said only half of the rice got planted because fields were too wet for groundwork.

“It was a good thing we couldn’t plant the whole crop,” he said.

Rice plants in several fields were covered with floodwaters three times, he said. Hurricane Barry’s winds were brutal on the crop, resulting in blank panicles.

“Just as the plants were flowering, it just got beat to death,” he said.

Zaunbrecher said no attempt was made at growing a second crop because the fields were badly rutted from harvesting.

In St. Martin Parish, farmer Jeff Durand said he and his brothers had a difficult year, and they’d like to forget about it.

“It’s not easy to forget because we’ve got to pay the bills,” he said.

Yields were 35% to 40% less than what they normally expect, he said, and even a hybrid field only cut 33 barrels, or 120 bushels. Normally, he said the hybrid has produced 55 to 60 barrels, or 200 to 220 bushels.

Weather caused problems throughout the growing season, he said, but Hurricane Barry caused significant wind damage. Then a thunderstorm caused more damage.

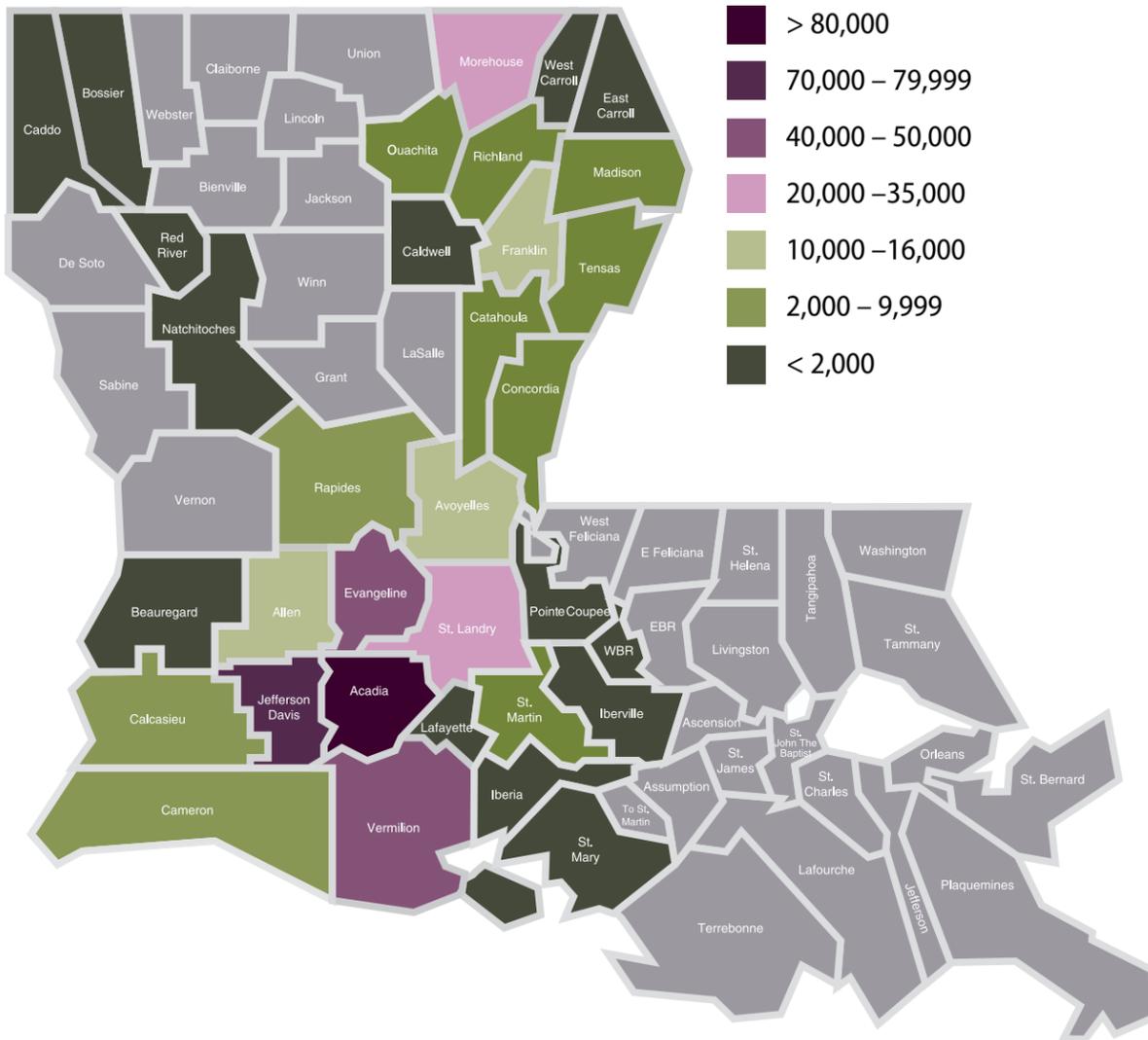
“All the early rice was headed when it got hit by hail,” he said.

He said propiconazole was effective at preventing smut disease. A nearby farmer didn’t spray, he said, and his combine was covered in black soot from kernel smut.

Durand said they had a bad infestation of weedy rice in one field. Two applications of Newpath barely affected it, he said, so the field probably will be planted in Provisia next year.

He said he’s not sure how much rice they will plant next year, but he doubts they will increase acreage.

2019 Louisiana Rice Acreage by Parish, All Types



Top 10 Rice Parishes

Parish	2019 Total Acreage	2018 Total Acreage
Acadia	84,007	83,831
Jefferson Davis	77,799	82,671
Vermilion	48,483	49,182
Evangeline	44,894	45,185
Morehouse	33,981	29,062
St. Landry	23,354	26,076
Avoyelles	13,778	14,283
Allen	13,431	15,672
Franklin	10,428	4,705
Rapides	9,880	10,654

2019 Total: 415,000
2018 Total: 434,123

Fast Facts

\$1.84M

Total funding for 2020 rice research projects.

3

Number of times many Louisiana rice fields were inundated with floodwaters.

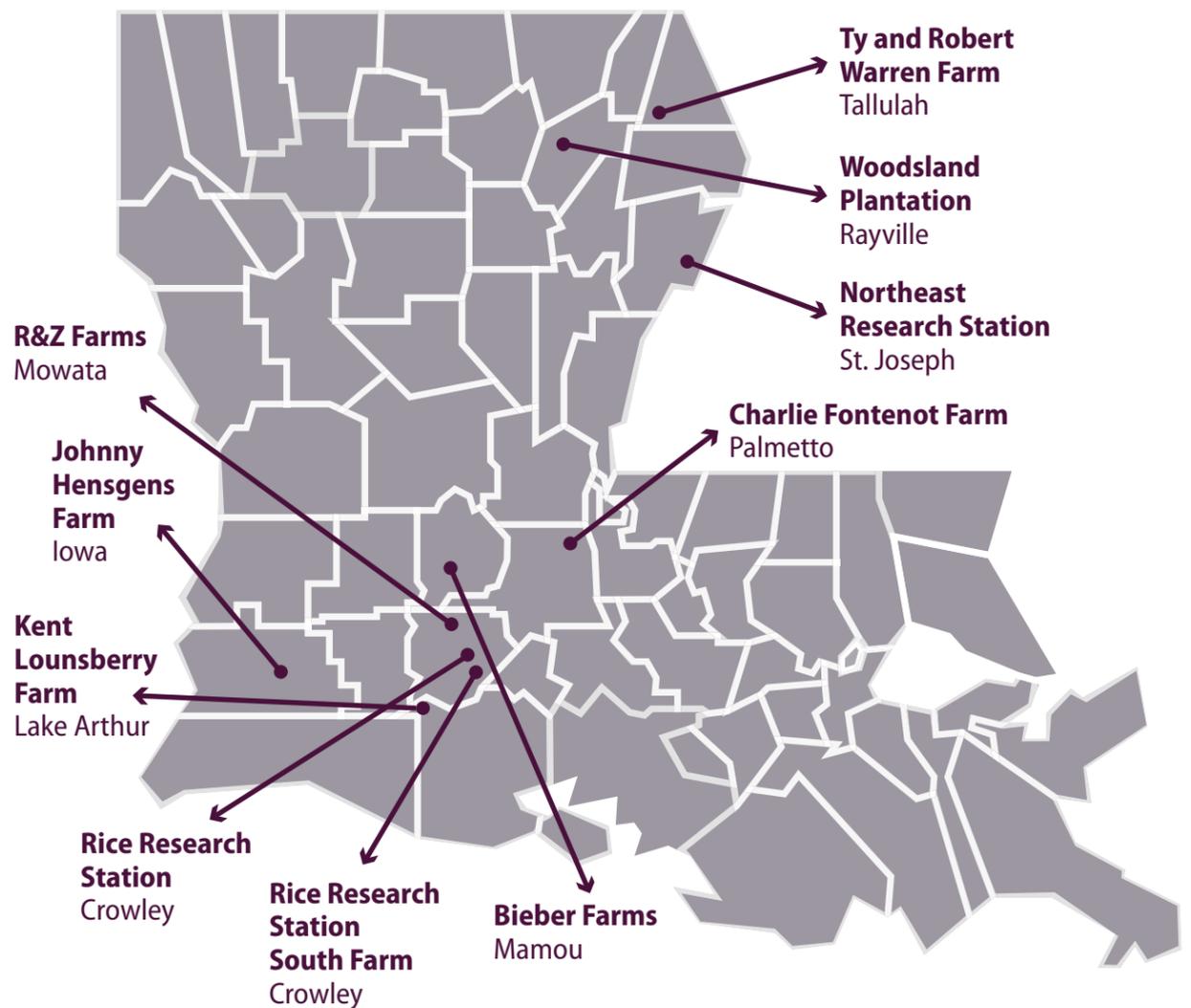
7%

Percent increase in rice exports from 2018 to 2019.

415,000

Number of acres of Louisiana-grown rice in 2019.

Research Trial Locations





Eunice farmer Mike Fruge with the harvest of his Frontiere variety.

Farmer growing, marketing high-protein rice developed by AgCenter researchers

A unique rice variety developed by AgCenter researchers Herry Utomo and Ida Wenefrida was grown in 2019 by a Louisiana farmer who has started his own rice brand.

The variety, Frontiere, was bred for a higher protein level. Most rice has a protein content of approximately 6%. The protein level in Frontiere is 10.6%.

“The idea is to address malnutrition, especially in developing countries,” said Wenefrida, an LSU AgCenter plant biotechnologist.

Utomo, an LSU AgCenter geneticist, said rice is a staple of the diet in many developing nations where people often lack enough protein.

“Typically, in most tropical countries, it’s very expensive to buy meat,” Utomo said. “It’s getting better, but there is still an acute malnutrition problem.”

The protein level was boosted through mutational breeding. Seeds of the rice variety Cypress, chosen for its high milling quality, were exposed to a chemical agent that induces genetic mutations. Using genetic screening, Utomo found lines with high lysine levels that indicate a higher amount of protein.

Utomo said they are working to boost the protein level even higher.

Wenefrida said efforts are underway to boost the yields. Currently, Frontiere yields are 7% lower than Cypress.

Eunice rice farmer Michael Fruge grew two fields of Frontiere in Louisiana and said the variety was fairly resistant to sheath blight. “Actually, it seems to have less sheath blight than some of my other rice,” Fruge said.

The rice is a long grain, but it cooks with medium-grain rice characteristics, he said. Frontiere is softer than most American long-grain rice varieties, and it tends to become mushy if it’s cooked too long, Wenefrida said.

Given the low yield reports throughout south Louisiana in 2019, Fruge said he was pleased with the 142- to 145-bushel yield from Frontiere.



Farmer Mike Fruge, at left, with the developers of Frontiere rice, LSU AgCenter faculty members Ida Wenefrida, center, and Herry Utomo.

Fruge has a label for the rice that he has branded as Prairie Acadian. It will be processed and bagged at Falcon Rice Mill in Crowley.

Fruge bought Frontiere seed from farmer Blake Gerard, who is growing Frontiere in Illinois across the Mississippi River from St. Louis.

Bob Butcher obtained an exclusive license with the LSU AgCenter to grow Frontiere in Illinois. It is sold under the trade name Cahokia, after an American Indian tribe from the St. Louis area.

Butcher said he learned about Frontiere when he started looking for a unique rice variety to sell.

“LSU’s rice with naturally higher protein was about the only thing I could find,” he said.

Butcher said the rice is appealing because of its nutty flavor.

He said he is about to start selling Frontiere rice flour for baking. He said a graduate student working under Joan King, LSU AgCenter food scientist, tested the rice flour possibility.

Normally, he said, rice flour isn’t suited for baking because of low protein levels, but Frontiere-based rice flour doesn’t have that problem, and it is gluten-free.



LSU AgCenter researchers are testing fertilizer applications during irrigation with poly pipe in row rice. Photo by Dennis Burns.

Agents experiment with applying fertilizer through poly pipe

Two LSU AgCenter extension agents experimented with applying fertilizer in poly pipe while irrigating row rice in 2019.

Dennis Burns, county agent in Tensas Parish, and R.L. Frazier, county agent in Madison Parish, worked with the concept.

Burns said the idea is to save on the expense of applying fertilizer.

“You have to water anyway, and you’re basically just flushing a field,” he said. “It just makes sense that we should be able to use that water as a delivery system.”

The three-year project is being done on research plots at the LSU AgCenter Northeast Research Station near St. Joseph.

“It’s still got a lot of potential if we can get our timing and method down,” Burns said. “We’re not confident enough to put it on a farmer’s field yet.”

Burns said a 1.2 gallon per hour pump was used to inject the fertilizer into the poly pipe.

“We were always shooting for 40 to 50 units of nitrogen,” he said.

He said the fertilizer was not distributed evenly across a field, and yields reflected that. The first time, he said, all the fertilizer was pumped at once.

The second time, water was pumped onto the field before the fertilizer was applied.

“We learned a lot every time we did it,” Burns said.

Josh Copes, LSU AgCenter agronomist, and his staff conducted most of the data collection.

Burns said the work will continue in 2020 with the goal of uniform distribution of fertilizer. Rice will be drilled into a no-till seedbed where soybeans were grown in 2019. He said the plots next year will be planted differently.

“Planting at a slight angle allows for more consistent planting depth, and in our case on the research station, it gets us out of traveling in the same wheel tracks multiple times,” Burns said.

The irrigation and fertilizer application will be done in surges, he said. They will first let irrigation water saturate the soil. That should allow water with fertilizer to flow farther down the field. The fertilizer water will be released in surges, he said, instead of a continuous flow.

The practice has been used on other commodities, Burns said.

“It’s been done in Colorado on potatoes and other crops,” he said. “We’re just trying to make it work with rice.”

Wild pig bait trials progressing

A bait to kill wild pigs is progressing, said Glen Gentry, LSU AgCenter feral swine specialist.

“We hope we can move forward with field trials with the U.S. Department of Agriculture in the next year,” he said.

The ingredient, sodium nitrite, is contained in a matrix with dehydrated fish. Gentry said pigs actually prefer the bait containing sodium nitrite, probably because of the salt taste.

“Pigs even prefer our bait to whole corn,” he said.

A provisional patent application has been filed for the bait, he said, and the LSU AgCenter could benefit from royalties when the product goes to market.

Gentry said a major challenge was preventing the sodium nitrite from breaking down to sodium nitrate, which is not as fatal for pigs. The solution to that problem came from simple chemistry, using an alkaline — calcium carbonate or sodium bicarbonate — in the matrix.

“Sodium nitrite doesn’t break down in an alkaline environment,” Gentry explained.

He said trials conducted so far show the bait is effective at killing pigs within two to three hours.

Gentry said humans can consume sodium nitrite safely at levels below 200 parts per million, and meat from a pig that dies from the material contains about 100 parts per million, he said.

Cercospora resistance gene discovered

Discovery of a rice gene linked to resistance to Cercospora disease has helped in the development of new rice varieties.

“It’s allowed us to breed for resistance,” said Don Groth, LSU AgCenter plant pathologist.

Groth said it was originally thought that several genes were responsible for Cercospora susceptibility or resistance. He said developing resistance before discovery of the gene was difficult because the disease was not prevalent every year.

With the gene identified, he said, new lines will continue to be tested for resistance.

“Even if the gene is there, you want to make sure it’s functioning,” Groth said.

Christopher Addison found the genetic trait, identified as CRSP2.1, according to Adam Famoso, LSU AgCenter rice breeder. Famoso said Groth scored a breeding population that was segregating for disease.

“It was clear as day there was a very strong gene for Cercospora resistance,” Famoso said.

Then Addison took over the project. His analysis determined that the single gene responsible for Cercospora susceptibility was one of 40 to 50 genes, but current technology does not allow isolation of the lone gene, Famoso said.

The origin of the gene probably can be traced back to a California variety L202 that was used as a parent for Cypress, Famoso said. Cypress was then used as a parent for other popular varieties, including Cocodrie, as well as Clearfield.

Famoso said a line without the gene will not be automatically excluded if it has other desirable traits.

Two new hybrid lines showing promise

Research into hybrid rice at the LSU AgCenter H. Rouse Caffey Rice Research Station is progressing, with two hybrids, LAH169 and CLH161, showing promise as commercial releases, said rice geneticist Jim Oard.

“Both hybrids continue to show good yields and good grain quality across multiple locations,” Oard said.

He said LAH169 had an average yield, exceeding 9,000 pounds per acre in the Uniform Regional Nursery, a cooperative test among six rice-growing states. In a commercial advanced test, it yielded almost 9,500 pounds with good milling.

This past year, both hybrids showed low levels of disease, especially smuts that affected conventional varieties, he said.

The hybrid yield testing of LAH169 showed a 23% yield advantage over elite varieties and a 20% to 23% advantage over CL153 and CL111.

CLH161 had a 9,750-pound yield in the commercial advanced testing and more than 10,000 pounds in the Uniform Regional Nursery test at the rice research station. Another test showed a 24% yield advantage over CL153.

Five new hybrid lines grown in small plots at the station produced yields exceeding some commercial hybrids, Oard said.

Three new hybrid lines in an observational trial had high yields with good disease resistance.

“We continue to develop our parents for the hybrids, both males and females,” Oard said.

He said the hybrid project continues to make improvements in seed production by working with



Workers at the Rice Research Station drag a rope across breeding plots of hybrid rice to induce cross pollination. Photo by Jessica Thornton and Tara Roy.

seeding rates, gibberillic acid, planting dates and planting configurations.

“Getting high yields for the farmers is obviously important, but it is not enough,” he said. “The breeding program also needs to identify parental combinations that consistently produce the hybrid seed at commercially acceptable levels.”

In a separate study with Adam Famoso, LSU AgCenter rice breeder, one inbred line showed good levels of

sheath blight resistance and produced yields exceeding CL111 and CL153.

Oard said with climate change creating potential problems for rice farmers, this line could help develop a new variety that could withstand disease pressure like what farmers faced in 2019.

“This line might be a good candidate to help accomplish that goal,” he said.

Graduate student working with drones

LSU graduate student Anna Coker has been working with drones, also called unmanned aerial vehicles, or UAVs, to analyze plots of various rice varieties to determine midseason nitrogen needs.

Coker’s work earned her a master’s degree in that area of concentration, and she is now pursuing a doctorate.

Her study will focus on comparing data obtained from a land-based GreenSeeker sensor and an airborne remote sensor on a UAV that measures near-infrared light to obtain a normalized difference vegetative index that can be used to gauge plant growth stages and plant health.

Dustin Harrell, LSU AgCenter rice extension specialist, said the GreenSeeker device provides sufficient data for a nitrogen prescription. But he said the GreenSeeker can only be used for a small portion of a field because it is handheld, and it is too heavy to be attached to a drone. A drone equipped with a sensor can fly over an entire field.

Using data collected from fields in 2017 and 2018, she has determined that a new algorithm based solely on a UAV-derived normalized difference vegetative index should be developed to interpret more reliable data from the UAV.

“I’m looking at the relations between the GreenSeeker and the UAV,” she said. “We’re also trying to determine ways to eliminate the errors you’ll get with a UAV.”

Those errors occur because of natural variations in the UAV’s passive light sensor caused by clouds and the position of the sun at different times of the day that affect the normalized difference vegetative index readings, she said.

Coker has a solid agricultural background, and she has farmed rice with her father in Arkansas.

“This past spring, I had time to help with the tillage, so I drove a tractor,” she said, “and during the summer I helped with the poly pipe and shoveled levee gates.”

New fungicide on the horizon

Farmers should have a new fungicide in 2020 or 2021.

“It will be similar to Sercadis and Elegia with the same mode of action,” said Don Groth, LSU AgCenter plant pathologist.

“Sercadis is not on the market any longer, and this new product will give farmers another option,” he said.

Groth said it will be effective against the strobilurin-resistant sheath blight fungus and wild types.

Additional work on Amistar Top this year failed to show any great increase in effectiveness, he said. Amistar Top showed promise in three years of testing in small plots treated with the chemical sprayed in backpack sprayers.

Amistar Top was first used commercially on rice in 2018 with disappointing results after applications by aircraft.

More testing and refinement in 2019 showed no better results, he said, even with different timings and rates.

“We didn’t find that silver bullet to make that product work as well as we hoped,” he said.

Although disease control was not as good as other products, yield increases were comparable.

Amistar Top worked best with an application at boot and again at heading, and it also had effectiveness when it was used sequentially with Elegia, but Groth said either option is considerably more expensive.

However, Amistar Top does have a practical fit for second-crop rice, he said, and the product is labeled for that use.

Weed research focuses on Loyant

Weed control research in 2019 included a focus on the herbicide Loyant.

Eric Webster, LSU AgCenter weed scientist, said he tested treating granular fertilizer with Loyant herbicide.

He said he wants to do more testing in 2020 to determine if Loyant’s effectiveness is compromised when added to a fertilizer.

“It doesn’t appear that it does, but we want to make sure,” Webster said.

He said the combination will work well if weeds are small.

“On 1- to 2-inch weeds, it seems to be doing a pretty good job,” Webster said. “If it’s 2 or 3 inches out of the water, you’ll have trouble controlling it.”

He said the testing in 2019 involved applying the herbicide-treated fertilizer in flooded rice but testing in 2020 will include testing on dry soil.

He said he also tested Loyant mixed with benzobicyclon and Gambit to find out if the combined chemicals lose their weed-control characteristics.

Webster said he will be testing a reduction of the rate of the Provisia herbicide to three 10-ounce

applications to stay within the 31-ounce restriction for a crop. Current recommendations call for two applications of 13 to 15 ounces.

He said the Provisia technology continues to help farmers control problem fields.

“I think the PVL02 will be a better option for us,” Webster said.

Webster said the challenges of the 2019 growing season included an unusual wild plant pest, gooseweed, that tends to grow in open areas and was found in Evangeline Parish.

“Some farmers were treating it with Loyant, but I hear varying results,” he said. “A lot of times, a good stand will solve those issues.”

Webster said farmers who use the row rice practice should weigh the potential water savings against the additional expense of weed control. Herbicides with more residual activity are required. Rice herbicides were developed with the expectation that a crop would be flooded from early to midseason, he said.

Also, he said growing rice in upland conditions shifts the weed spectrum to those found in row crops, so farmers end up having to deal with weeds such as johnsongrass and pigweed.



Jeremy Hebert, LSU AgCenter county agent in Acadia Parish, takes a sample of rice from a harvest on a verification field north of Crowley.

Rice Verification Program teaches farmers 'finer points'

The LSU AgCenter Rice Verification Program helps farmers learn the finer points of growing rice, starting farmers with field preparation and working with them through harvest.

Plans are developed with observations from weekly scouting of the fields, said Dustin Harrell, LSU AgCenter rice extension specialist.

County agents and crop consultants involved in the program also learn from it, Harrell said.

"It really opens up a lot of growers' eyes to looking at things differently," he said. "We find that growers have higher yields when they follow LSU AgCenter best management practices."

This year the program worked with farmers in Acadia, Jefferson Davis, Evangeline and Morehouse parishes in 2019.

Keith Fontenot, LSU AgCenter extension associate for the program, said the difficult growing conditions in 2019 made applications of fertilizer and pesticides challenging, he said.

"This year's verification program reinforced the importance of timing of all applications," Fontenot said.

He said it's critical that applications be made according to growth stages. The cool, wet early season interfered with fertilizer applications, forcing farmers to make applications in the water with significant nitrogen losses.

A field in Jefferson Davis Parish near Welsh that was farmed by Dylan Benoit had the highest yield of 41 barrels dry, or 150 bushels, of Mermentau. Fontenot said the field didn't have problems with stink bugs found in many areas of the state's rice growing region.

"Because it was planted so early, we missed the big part of that stink bug population," Fontenot said.



Jimmy Meaux, LSU AgCenter county agent, at left, and Keith Fontenot, LSU AgCenter extension specialist with the Rice Verification Program, scout a rice field near Welsh. The weekly visits to the fields in the verification program are made to keep track of a field's progress and to identify problems.

Fontenot said that field was water-planted March 23, the earliest of the five fields in the verification program. Fontenot said it likely benefitted from the earlier planting because it was no longer flowering when Hurricane Barry hit in July. It was the only field used for a second crop, which yielded 14 barrels, or 50 bushels.

Jimmy Meaux, LSU AgCenter county agent for Jefferson Davis Parish, participated in weekly field visits.

The Acadia Parish field was dry broadcast with CL153 on April 3 by farmer Phillip Reiners from Rayne. It yielded 37 barrels, or 135 bushels dry, at harvest on Aug. 13.

Fontenot said this field suffered some yield drag due to the wet conditions. Also, mechanical problems

at a well caused a delay in fertilizer application as well as the recommended flushing of the field, and that hampered weed control efforts to control barnyardgrass and sprangletop.

Jeremy Hebert, LSU AgCenter county agent in Acadia Parish, accompanied Fontenot on the weekly scouting trips.

The Evangeline Parish field was drill-seeded with Cheniere by farmer Jeremy Craton on May 1, and it recorded 37 barrels, 135 bushels, at harvest on Sept. 5. Todd Fontenot, LSU AgCenter county agent for Evangeline Parish, worked with Fontenot on this field.

The Morehouse Parish field, farmed by Robert and Ty Warren, was drill-seeded with CLXL745 on May 25 and 27. Harvest was on Oct. 25 with a yield of 39 barrels dry, or 140 bushels.

Fontenot said the Morehouse Parish field was the first time that a field of row rice, or furrow-irrigated rice, had been in the verification program. He said it was difficult to obtain even distribution of water. Also, rice plants on more than half of the field were lodged from a storm, resulting in a decreased yield and quality.

Fontenot said farmers in Evangeline and Acadia parishes were trying to cut expenses with the expectation of a high profitability from crawfish. "That's a lot of the scenario you're going to see in south Louisiana," he said.

Fontenot said none of the four fields had damage from hogs, "but all the farmers in the program had damage from hogs in other fields, and some had damage in several fields."

Harrell said next year's verification program will have five fields.

La. Rice Research Board funds new AgCenter research chair

At its November meeting, the Louisiana Rice Research Board provided an additional \$500,000 earmarked for a research chair, bringing the total to \$2 million set aside from Colombian Free Trade Agreement money that must be earmarked for rice research in Louisiana.

The additional funding establishes the endowment as a super chair, the only one in the LSU AgCenter and one of only a few in the LSU system.

"This will be the first one of this magnitude for the LSU AgCenter," said Dr. Rogers Leonard, LSU AgCenter associate vice president for plants, soils and water resources.

Interest generated by the account will be used to enhance efforts at the rice station, and the board's allocation will not be touched.

"These funds will exist in perpetuity to support the research at the rice research station," Leonard said.

The board allocated \$1.5 million earlier in 2019 for the chair. That included \$1 million in January and \$500,000 at the annual field day at the H. Rouse Caffey Rice Research Station in June. Leonard said most super chairs have been supplemented by the Board of Regents, but this chair is totally funded by the LRRB.

Dr. Don Groth, LSU AgCenter plant pathologist, said the money will be used to pay for research projects.

"It took years of hard work by a lot of people to get this established," Groth said.

Research money on all levels is decreasing, Groth said, and the chair funds will be a significant boost to research at the rice research station.

"It will go to overall station support," Groth said, explaining that the board will be briefed on how it will be spent. "We'll keep track of what it's spent on and present that information to the board each year."

Richard Fontenot, board chairman, said planning for the chair began in 2015.

"This endowment has been in the works for a long time and now that it is official, I feel good knowing the rice industry will continue to benefit from world-class research that will come out of LSU thanks to this strengthened research program," he said.

Research station continues improvements



Rick Zaunbrecher, director of the LSU AgCenter Foundation Rice Seed Program, changes the nozzle on a spray rig purchased with funds generated by the Colombian Free Trade Agreement.



The Louisiana Rice Research Board held a ribbon cutting Nov. 7 for the office addition at the administrative building of the H. Rouse Caffey Rice Research Station. From left to right, front row, Dr. Dustin Harrell, rice research station research coordinator; board member Jeffery Sylvester; Bill Richardson, LSU vice president for agriculture; Richard Fontenot, board chairman; board member David LaCour; Don Groth, rice research station resident coordinator; back row, board member Jude Doise; board Vice Chairman Dane Hebert; board members Alan Lawson, Sammy Noel and John Earles; Benjy Rayburn, board member for the Louisiana Department of Agriculture and Forestry; Kurt Guidry, LSU AgCenter Southwest Region director; and board members Eric Savant and Jerry Leonards.



Workers complete the final stages of construction for a new mill at the H. Rouse Caffey Rice Research Station.

New research lets breeders predict results of crossing rice lines

An ongoing research project has the potential to dramatically accelerate the breeding program at the H. Rouse Caffey Rice Research Station.

The two-year program began in June 2019 with support from Horizon Ag Products.

Post-doctorate researcher Chris Hernandez is working at Cornell University in Ithaca, New York, with faculty members Kelly Robbin and Susan McCouch to develop a system that allows rice breeders to predict the result of crossing different lines of rice.

“He is working to develop and optimize methodologies to do genetic predictions with our breeding program,” said Adam Famoso, LSU AgCenter rice breeder.

He said Hernandez is using statistical methodologies to enable genomic predictions of a line’s performance. This will allow breeders to predict the performance of a line for complex traits, including yield and grain quality, before testing it in the field, he said.

Famoso said that traits with simple genetics, such as amylose content, blast resistance and aroma are determined by a single gene and direct marker assisted selection for the target gene is very effective. But this project will focus on complex traits, such as yield potential, sheath blight resistance, milling quality and chalk, all involving several genes, he said.

Since 2017, leaf tissue from each entry tested in yield trials at the rice research station has been collected and frozen. Those samples have been phenotyped as part of the regular breeding activities. Recently, 2,000 of these lines have been sent for genotyping with 1,000 DNA markers. This year, Famoso said, Hernandez will use this initial data set to optimize the methods and the number of markers necessary so that future applications will be as cost-effective as possible.

Hernandez has a unique skill set that combines the computational skills with the practical experience in the field with applied plant breeding, Famoso said.

Hernandez is working alongside geneticists also focused on genomic selection at Cornell, a world-class center of genetic research.



Chris Hernandez is working at Cornell University in Ithaca, New York, to develop a computer program enabling rice breeders to predict the outcome of crosses of different lines of rice. Photo by Kyle LaPlant.

“He is working with leaders in this field to best develop and optimize the methods for application in our specific rice breeding program,” Famoso said.

Hernandez visits the rice research station a few times a year, and he details his progress in regular phone meetings.

Famoso said this system Hernandez is developing will allow the selection of lines for crosses with a highly improved chance of obtaining desired outcomes, improving efficiency and use of space.

He said the breeding project will start using Hernandez’s work in 2020. “We’ll start predicting all the lines in our tests,” Famoso said.

“We’re now choosing lines from a field of 8,000 to 10,000 rather than the current 2,000,” he said. “It’s not a replacement for field testing, but an additional

level of selection to determine what should we should test in the field in the first place.”

Hernandez said his work should make variety development more efficient.

“A lot of work goes into developing new rice varieties — a line needs to be evaluated across multiple years and at many locations throughout the state to determine its true potential,” he said. “With genomic prediction we are using DNA markers to share information across related lines in a way that allows us to make more accurate or earlier selections without increasing the number of evaluations in the field. The end result should be even better varieties for rice farmers delivered in a way that makes the most efficient use of breeding resources.”

Entomologist studies apple snails in rice-growing areas

LSU AgCenter entomologists are working to defend rice crops from insects both before and after harvest.

The apple snail that is spreading to more rice-growing areas and building to high populations in some areas does not appear to be an economic pest of rice for Louisiana, according to Blake Wilson, LSU AgCenter entomologist.

However, the invasive species is a problem for young rice in Asia and Spain.

“In the greenhouse studies, we weren’t able to get the snails to eat seedlings,” Wilson said. “I’m hesitant to say that they don’t pose any threat.”

Wilson said he has received reports from Texas that the snails burrow into levees.

He said monitoring of drill-seeded and water-seeded rice didn’t reveal any damage to rice by the snails.

“We didn’t see any stand losses,” Wilson said.

He said the snail is a pest for crawfish farmers because it can clog traps and reduce vegetation used for forage.

The use of copper sulfate has shown to be effective at 2 parts per million, but he is conducting work to see if a reduced rate can remain effective. Copper sulfate is harmful to crawfish, he said. Ongoing research is investigating chemical controls that are compatible with crawfish production.

Graduate student Julian Lucero is monitoring

fields to determine how rapidly the snail is expanding its range in Louisiana, and he will look for factors that may be related to the mollusk’s expansion.

Protecting a crop in storage after harvest and before milling has been the focus of work by Wilson and Qian Sun, LSU AgCenter entomologists.

Wilson said the use of precision temperature controls in grain bins has proven to be effective at preventing damaging insect populations from developing in stored grain. He said the systems’ abilities to maintain low temperatures and humidity repress insect reproduction.

The main pests of stored rice are the rice weevil, the lesser grain borer and the Angoumois grain moth.

He said work is being done to learn if chemical controls are more effective when they are applied to a grain bin when it is empty or directly on stored rice.

“We’re testing all the different options alone, as well as in combination,” Wilson said.

He said simulated grain bins are being used for the testing.

Six products are registered for use on stored grain, he said, but their effectiveness on rice has not been thoroughly tested.

Wilson also said testing is being done to find out if insect pests have a rice variety preference and to examine sampling protocols, which can be used to assess the need for fumigation.



ABOVE: A mass of apple snail eggs on a rice plant. The snails have not been a pest of rice in Louisiana yet, but they can cause problems for crawfish farmers. LEFT: Rice weevils feed on rice grains.

Economist: Decreased production helps U.S. rice market improve

The U.S. rice market has improved because of decreased production that boosted prices, economists say.

"It's definitely improved from where we were last year," said Mike Deliberto, LSU AgCenter economist.

The long-grain price has improved by more than \$1 a hundredweight, he said.

One reason for the increase was a decrease in U.S. rice production by 16% from 2018. Yields and harvested acres both decreased, Deliberto said, and that caused a decrease in supply, with ending stocks at 38% lower than last year.

The 2019 long-grain crop was the smallest in seven years, he said.

"That tightness in the market is price supportive," Deliberto said.

Louisiana rice acreage, which totaled 415,000 in 2019, declined 4% from 2018, the smallest decrease among the southern rice-growing states, Deliberto said.

Arkansas acreage decreased by 430,000 acres, bringing its total to 1.1 million. The average U.S. rice harvest was 6,650 pounds per acre, he said, the lowest in three years.

Meanwhile, rice imports continue to increase.

"We are still seeing imports at 2% higher than they were last year," he said.

And exports have increased slightly. All exports are still about 7% higher than last year.

He said the U.S. had lost market share in Mexico, the biggest buyer of U.S. rice, but a decline in Brazilian rice production provided the opportunity for the U.S. to regain some of that lost business.

Purchases by Iraq in 2019 helped prices, he said, but it's uncertain if that country will become a consistent customer.

In 2019, Deliberto started writing a new monthly crop update sent by email that details international and domestic market developments for rice, corn, soybeans and cotton.

He also generates a quarterly ag policy newsletter to relay information about trade, changes in foreign labor policy and farm management tools. In the fall, he embarked on a statewide tour to explain the effects of the new farm bill.

In addition, Deliberto updated several decision-making tools to help farmers, including a rental rate evaluation program and a rice cash flow model. He also started an enterprise budget for farmers who use the row rice practice.

Louisiana Rice Research-January 2020

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For more information on Louisiana rice production and Rice Research Board activities, visit this website:
www.lsuagcenter.com/topics/crops/rice.

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Rice Research Projects for 2020

CONTINUING PROJECTS

Agricultural Economics and Agribusiness

\$40,000
Economic Analysis of Rice Production and Farm Management in Louisiana
Michael Deliberto (Salassi)

Entomology

\$112,100
Integrated Management Strategies for Insect Pests of Rice
Blake Wilson (Sun)

Experimental Statistics

\$25,000
Implementation of Digital Agricultural Techniques to Improve Outcomes and Practices at the Rice Research Station
Thanos Gentimis

Bob R. Jones Idlewild Research Station

\$15,000
Development of an Encapsulation Protocol for Sodium Nitrite for Control of Feral Swine in Rice
Glen Gentry

Northeast Research Station

\$80,000
Nitrogen Fertilization of Furrow-Irrigated Rice Using Surge Valve Irrigation
Josh Copes

Yield Evaluation of Commercial-Advanced Testing Program in Northeast Louisiana
Donnie Miller

Best Management Practices for Row Rice Production Systems in Northeast Louisiana
Donnie Miller

Plant Pathology and Crop Physiology

\$50,000
Characterization and Utilization of Genetic Traits for Resistance to Multiple Diseases of Rice
Jong Hyun Ham

H. Rouse Caffey Rice Research Station

\$1,267,258

Applied Molecular Breeding
Brijesh Angira

Multiple Generation Rice Breeding Nursery
Adam Famoso

Development of Superior Rice Varieties for Louisiana
Adam Famoso

Enhancement of Rice Research and Extension Communications
Frankie Gould

Development of Disease Control Practices in Rice
Don Groth

Rice Management Strategies for Efficient Utilization of Agronomic Inputs and Natural Resources
Dustin Harrell

Louisiana Rice Research Verification Program
Dustin Harrell

Effect of Water Management Practices on Nitrogen-Use Efficiency and Yield of Drill-Seeded, Delayed Flood Rice Production
Manoch Kongchum

Development of Hybrid Rice and Sheath Blight-Resistant Germplasm for Louisiana
James Oard

Developing High Yielding Rice With Lower Glycemic Index, Increased Bran Oil and Improved Baking Quality for Emerging Markets
Herry Utomo

Rice Grain Quality Enhancement: Characterization of Elite High-Protein Lines and Development of Herbicide-Resistant Rice
Ida Wenefrida

School of Plant, Environmental and Soil Sciences

\$214,648

Remote-Sensing Ground Control Point Network to Support Precision Agriculture in Rice Farms
Luciano Shiratsuchi

Breeding Salt-Tolerant Rice Varieties
Prasanta Subudhi

Weed Management in Herbicide-Resistant/Tolerant and Conventional Rice
Eric Webster

NEW PROJECTS

Northeast Research Station

\$14,800
Evaluation of Fungicides on Important Rice Diseases Under Upland (Row Rice) Conditions
Paul Price

COLTRQ FUNDING

\$20,000
Black Bird Research
Don Groth

TOTAL

Total funding for 2020: \$1,838,806