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H. Rouse Caffey
RICE RESEARCH STATION NEWS

Volume 14 Issue 2 May 1, 2017

1909-2015
52 released varieties

Southwest Region

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MAXIMIZING YIELD POTENTIAL IN THE RATOON CROP

The first thing to maximize ratoon yield potential is to have a plan from the beginning of the season of which fields will be ratooned. Unfortunately, many farmers like to have a wait-and-see attitude when it comes to ratooning rice. They like to wait and see how the ratoon regrowth is coming back before they make the decision to ratoon a particular field. This adds additional time and stress to the producer during their busiest time of the year – harvest season. Make it easy on yourself and decide which fields to ratoon from the get-go. Choose the best producing fields, early maturing rice varieties or hybrids with a record of good second crop potential, and plant those cultivars prior to April 15.

Harvest time is critical to maximizing ratoon potential. Harvesting prior to Aug. 15 will, in most years, insure that you will have enough time for the ratoon crop to mature prior to the first frost. Harvesting of the first crop should be done at the optimum grain moisture, between 18 and 22 percent. Harvesting at this time will not only improve the harvest efficiency and grain quality of the first crop, but it will also leave behind greener and healthier ratoon stubble. Through observation we have seen that ratoon regrowth tends to be slower and produces a thinner stand with fewer tillers per square foot when the main crop rice is harvested at lower grain moistures. Keeping field rutting at a minimum during the main crop harvest is another key to maximizing ratoon regrowth.

Stubble management is the biggest management practice that can be done to increase ratoon crop potential. In most years, stubble management practices alone can increase ratoon yields by 5-barrels or more. Stubble management practices include post-harvest mowing (flail or bush-hogging) to approximately 8-inches (or lower) and post-harvest rolling of the stubble. All the practices force the regrowth to come from the crown node or the first node above the crown. Research has shown that panicles that come from the crown node are typically bigger, have more grains per panicle, and have more filled grains per panicle, compared to panicles that derive from nodes higher up on the stubble. Another advantage of stubble management practices is that they even out the grain maturity of the ratoon crop. The only disadvantage with stubble management practices is that they will delay the maturity of the ratoon crop by about 2-weeks.

The optimum nitrogen (N) rate for the ratoon crop, in most years, across all rice varieties and hybrids is 90 pounds of N per acre or approximately two-hundred pounds of urea. The N should be applied immediately after harvest and a shallow flood should be immediately established afterward. If a soil test shows that the soil falls into the medium, low, or very low soil test categories for phosphorus (P) or potassium (K), an additional 30 pounds of P (as P_2O_5) or K (as K_2O) above the main crop recommendation will be needed to maximize ratoon yield potential. This additional P and K can be applied in the first crop or after the first crop harvest along with the N fertilizer.

Dr. Dustin Harrell
dharrell@agcenter.lsu.edu

Post-harvest stubble manipulation practices often result in improvements in rice yield, evens panicle emergence and delays maturity by approximately 2 weeks. In the above picture, the ratoon stubble height was reduced to approximately 8 inches post harvest mowing.

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Special Dates of Interest:

- **2017 H. Rouse Caffey Rice Research Station Field Day Wednesday, June 28, 2017 Crowley, LA**
- **Vermilion Rice Field Day May 25 - Klondike area**
- **Southwest Rice Field Tour May 31 - Fenton area**
- **Evangeline Rice Field Day June 1 - Mamou area**
- **Northeast LA Rice Field Day July 12 - Oak Ridge area**

Rice Variety Development – Late Stages

In previous articles, rice variety development beginning with the crossing program through preliminary yield testing was discussed. This normally takes a minimum of 5-6 years. The lines that display superior characteristics in preliminary testing are considered for advancement to our Commercial/Advanced (CA) trials, as well as the Uniform Regional Rice Nursery (URN). Only about 5 percent of lines entered into the preliminary trials will be advanced.

The CA trials are conducted throughout the rice growing regions of Louisiana. In 2017, these tests are being conducted at the H. Rouse Caffey Rice Research and Northeast Research stations as well as at off-station locations in Acadia, Evangeline, Jefferson Davis, Morehouse, St. Landry and Vermilion parishes. The off-station locations are conducted in cooperation with rice producers willing to provide land, land preparation, irrigation, and assistance with these trials in countless other ways. The farmer will provide an area that has independent flooding and draining capabilities. We will then plant the trial using the same small plot equipment used on the Rice Research Station.

After emergence, the trial is handled just as it would be on the research station to optimize production and minimize any environmental variation that would affect our ability to evaluate true genetic differences among the lines in the trials. These trials are evaluated at least weekly, and data are collected for all characteristics just as it's done on the research station. These trials are harvested using our small plot combine. Those trials harvested before Aug. 15 will be ratoon-cropped to provide data on this important characteristic.

The URN is a cooperative endeavor conducted by the public rice breeding programs in Arkansas, Louisiana, Mississippi, Missouri and Texas. The nursery is a yield testing program conducted at the primary research location in each of those states. The "Uniform" in URN comes from the fact that the same rice lines are tested at each of the five locations. The test currently contains 200 rice lines (or genotypes). The 200 entries in the test are made up of the elite lines from each breeding program that the breeders think might have the attributes for consideration as a new release, as well as the currently grown commercial varieties. Each of the breeding programs contributes a number of lines to the testing program. The yield test is then conducted at the research station in each state using the best cultural practices for that region. All data from the testing program are then provided to each cooperator.

Most of the experimental lines in our CA trials are also entered into the URN. Also, in both the URN and CA trials, the current commercial varieties are included to provide a benchmark for comparison purposes.

Between the CA and URN trials, our most advanced experimental lines are evaluated in 12-14 yield trials each year. The CA and URN trials are extremely important in making decisions on potential variety releases. It is critical that a line be evaluated under numerous environments. We are looking for superior and stable performance. We often see a line that will have excellent performance in two or three of these trials but average or inferior performance in several others. This line will be eliminated because of a lack of stability. Also, as with the preliminary trials, all of the entries in each of these trials are evaluated by Dr. Don Groth for relative susceptibility or resistance to major rice diseases.

Lines that show good and stable yield, milling and agronomic characteristics across all these diverse environments will be re-entered into these trials the following year. A line that shows good potential as a future release will also be provided to Dr. Dustin Harrell for inclusion in his statewide Variety by Nitrogen Rate testing program. In addition, Dr. Eric Webster will evaluate these lines for differential response to selected rice herbicides. This research is conducted so that if a line is released as a variety, we can also provide a package of agronomic recommendations for its production.

If a line displays significantly better performance than the current commercial varieties, it may also be grown as a larger headrow population as a step toward potential increase. Remember, each line in these testing programs is also concurrently being grown as panicle rows for purification and increase each year. A typical headrow population is approximately 1,000 rows, which is often grown at our winter nursery facility in Puerto Rico. Seed from this size headrow increase will easily provide enough seed for up to a 20-acre foundation seed field on the Rice Research Station. The foundation seed production is under the direction of Rick Zaunbrecher, who works closely with the breeders through each step of increase and purification.

We generally want at least three years of CA and URN data before we would consider a new variety release. We will be increasing seed on superior lines during this same time period so we often have foundation seed production during the third year of testing. If we feel that the line has consistently shown superior and stable performance after the third year of advanced testing and we have adequate foundation seed available, we will prepare a comprehensive data package on the line and provide this to the LSU AgCenter administration who will ultimately decide if a rice variety will be released based on recommendations of a committee appointed to review the merits of the experimental rice line.

Thus, rice variety development is a long-term process that demands a great deal of time, hard work and dedication by a large number of people within the LSU AgCenter.

Dr. Steve LInscombe
slinscombe@agcenter.lsu.edu

Pest of the Quarter - Rice Water Weevil

The rice water weevil (RWW), *Lissorhoptrus oryzophilus*, is an appropriate insect to focus on during the spring because infestations in rice fields occur this time of year shortly after establishment of permanent flood. However, because RWW has been the primary insect pest of rice in the U.S. since the late 1800s, "Pest of the Century" may be a more appropriate title. Indeed, this pest has caused many Louisiana rice farmers to lose sleep over the years, but the outlook has improved.

Historically, management of RWW infestations has been difficult to achieve. This is because the weevil larvae (Fig. 1a) remain submerged, feeding on rice roots beneath the soil surface, making them a difficult target for traditional insecticide applications. Adult weevils (Fig. 2a) emerge from over-wintering sites, including forests and bunch grasses, during the spring. They feed on rice leaves and other grasses, causing characteristic leaf scarring (Fig 2b). This scarring doesn't cause yield reductions, but it can indicate infestation severity. The flooding of rice fields triggers female weevils to lay their eggs. Larvae feed briefly on leaf tissue before moving down to the roots where their feeding can cause severe reductions in root mass (Fig 1b). If plants are easily dislodged in the soil or can be seen leaning or floating, significant root pruning has likely already occurred. Larval infestations typically peak 20–30 days after flooding, but the effects of root feeding last through harvest. Infestations cause thin stands, stunted growth, nutrient deficiencies, and delayed crop maturity. Although most injury occurs early in the season, the result is a reduction in grain yield at harvest. Without management, RWW infestations routinely cause 5–10 percent yield losses, and losses of more than 30 percent have been reported under heavy infestations. RWW infestations are particularly damaging in water-seeded rice as infestations occur immediately following seedling emergence. With potential for devastating crop losses to occur, every Louisiana rice farmer should have a pest management strategy to reduce RWW damage. Fortunately, thanks to decades of research and advances in insecticide technology, there are several effective control tactics available.

Figure 1. Rice water weevil larva and root pruning.

Figure 2. Rice water weevil adult and leaf scarring.

Since their introduction in 2008, insecticidal seed treatments have become the most popular choice for weevil management. Dermacor X100 (DuPont®) is the most widely used seed treatment in Louisiana and is now being used on approximately 90 percent of acreage. This product is popular because it provides superior weevil control and also controls stem borers. Other products including NipsIt Inside (Valent®) and Cruiser Maxx (Syngenta®) also provide effective control of RWW and other pest including colaspis, chinch bugs, and thrips. These products are often less expensive than Dermacor, and are the main products used in other rice producing regions of the country where stem borers are not a problem. It may be difficult to invest in an insecticidal seed treatment before you have seen any insects, but data indicate the treatments provide economic benefits in more than 80 percent of fields where they are used. Some growers may wish to avoid the higher input costs at planting, and opt to plant untreated seed. After-all, Louisiana farmers managed to get along without seed treatments before, and alternative strategies are available.

Foliar applications of pyrethroids targeting adult weevils are capable of providing adequate control, although some damage may still occur. These applications should be made only once permanent flood has been established and leaf scarring and adult weevils can be seen in the field. Nonchemical control measures include early planting, delayed flooding, and draining and drying fields approximately three weeks after flooding. In areas without a history of high weevil pressure, these methods can limit yield losses, but additional factors should be considered. Delayed flooding can lead to increased weed problems. Field draining will only be effective if fields are quickly dried and the flood re-established.

Regardless of which control approaches are utilized, make sure the RWW doesn't catch you off guard this spring. More information about RWW biology and management can be found in the Rice Insect Fact Sheets on the LSU AgCenter website at http://www.lsuagcenter.com/portals/communications/publications/management_guides/insect_guide/rice.

Dr. Blake Wilson
bwilson@agcenter.lsu.edu

Progress Update on implementing Markers in Variety Development Activities

Through the support of the Louisiana Rice Research Board, the H. Rouse Caffey Rice Research Station established a state-of-the-art molecular marker lab in 2016. The objective of this lab was to increase the sample throughput and reduce the cost to enable processing tens of thousands of experimental lines from the breeding program each year. The tangible goals are to enable us to screen new lines for key traits (disease traits, grain quality, and key agronomic traits) prior to evaluating the materials in the field.

A primary focus this past year has been to develop appropriate protocols to meet our research needs in the most cost effective manner. Through these efforts we are now capable of processing a data point for less than 4 cents and extracting DNA at less than 7 cents per sample. At maximum capacity, a single operator can generate over 40,000 data points in a day.

At this cost and throughput, we can routinely screen new F2 breeding populations for key traits of interest prior to planting into the field. This dramatically increases the number of our breeding lines with the desired traits, allowing us to focus our field resources for testing for yield, milling, and agronomics.

A typical job will include 8-16 populations in a week with the following steps for each F2 breeding population. Approximately 800 seeds per population will be sown in the greenhouse in small flats, and after 7 days, a 2mm leaf sample will be collected. These samples are then sent to the lab for DNA extraction and analysis for the appropriate markers.

An example population might be segregating for blast resistance and amylose content, in which case we expect approximately 100 of the 800 plants will contain both blast resistance and the appropriate amylose content. By screening through the marker lab we are capable of identifying these 100 plants and only transferring those that met our amylose and blast criteria to the field.

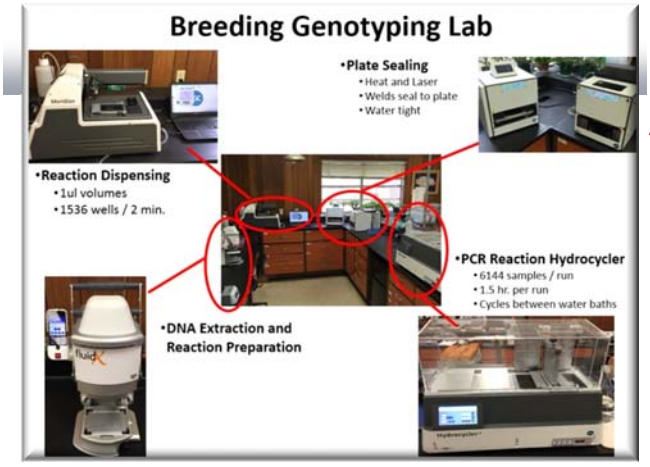
This approach allows us to have approximately 100 rows that all meet our desired criteria for blast resistance and amylose content, in contrast to when we go directly to the field (without the marker analysis), we expect about 30-40 of the rows to meet both criteria.

We anticipate processing over 50 new breeding populations this year through our Marker-Assisted Selection process for key traits, such as Clearfield and Provisia tolerance, multiple blast genes (identified as Pita, Pizt, Pib), amylose content, aroma, grain shape, and gelatinization temperature.

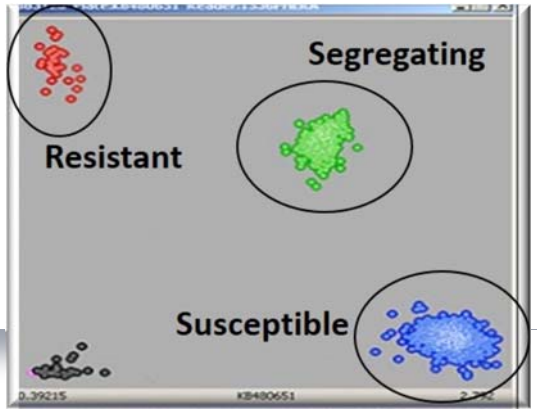
In addition to these applications at the beginning of the breeding process, we are also utilizing the marker lab at the end of the breeding process as part of our Foundation Seed Program, overseen by Rick Zaunbrecher. We are now routinely screening all headrows and seed sources going into our foundation seed production fields. This allows us to ensure no mix ups have occurred and allows us to identify potential outcrosses or segregating materials. When a potential off-type is identified, we can discard those plants prior to harvesting the seed, thereby reducing the probability of undesired seeds in our foundation seed.

In summary, we have made significant progress in the last year. We are currently focusing on developing new markers for additional traits of interest, and fine tuning some of the logistical constraints. We are very thankful for the investment from the Rice Research Board and are confident that this investment will make a tangible impact on the new varieties we develop.

Dr. Adam Famoso
afamoso@agcenter.lsu.edu



The genotyping equipment consists of modular components and takes up a small portion of the Anther Culture lab. The collective system is designed and sold by LGC Genomics Group.



The output is in the form of easily scored clusters. In the example the red dots represent blast resistant plants, the blue dots represent blast susceptible plants, and the green are plants that are still segregating. In this case we would transplant only the resistant plants for evaluation in the field.

Proper Fungicides and Timing

Sheath blight, blast, Cercospora, and grain smuts are reported in rice fields every year. Typical weather patterns (warm and moist) favor all of these diseases. As rice approaches reproductive stages, fungicide decisions need to be made based on the most serious disease present. **Remember fungicides need to be applied by 50-70 percent heading (emerging)!** If blast is present in a field and the variety is susceptible, then blast is the most important disease. I would plan on spraying a blast fungicide on these and other susceptible varieties at heading. This later application will still have good sheath blight and Cercospora activity but will miss the grain smut timing. Specific fungicide and timing recommendations for each disease are explained below:

- **Blast fungicide timing:** If a single application is being used, the best timing is when 50-70percent of the heads are emerging (heading) but not 100 percent completely emerged (headed). Application before or after this stage will not provide good control. If disease pressure is high, when the plants have a large number of active leaf blast lesions on them, two fungicide applications may be necessary to obtain effective control. The first application should be applied between mid-boot to very early heading to protect early emerging heads and reduce spore numbers, and the second application between 50-90 percent heading to protect the majority of the heads. Strobilurin fungicides (Quadris, Quilt, Quilt Excel, Stratego, and Equation) are the only fungicides active against blast. Use full labeled rates.

- **Sheath blight fungicide timing:** In the past, two fungicide treatments were necessary to reduce sheath blight, but with the advent of more effective fungicides and economic constraints that limit the number of applications, a single application approach is usually used. The best timing for a single sheath blight fungicide application is at the boot growth stage (2-4 inch panicle). Strobilurin fungicides (Quadris, Quilt, Quilt Excel, Stratego, and Equation) have the best activity against sheath blight but in areas where resistance to the strobilurins is present or suspected the alternate mode of action fungicides fluxapyroxad (Sercadis) or flutolanil (Convoy) must be used. It is a good idea to rotate the mode of action in fields that do not have strobilurin resistant *Rhizoctonia* to prevent or delay development of resistance.

- **Cercospora fungicide timing:** In general, you want to apply propiconazole (6 oz/A of Tilt or equivalent) for Cercospora at boot but before heading. However, the later rice is planted, the earlier fungicides should be applied. March planted rice should be applied at boot to heading, April planted rice should be applied at early boot (less than a 2-inch panicle) and May planted rice should be applied at panicle differentiation.

- **Kernel and False smut fungicide timing:** The best timing for the grain smuts is the booting growth stage. Propiconazole (6-10 oz/A of Tilt or equivalent) has the best activity but only suppresses false smut. Apply to fields planted with susceptible varieties and fields that have a history of smuts.

Multiple fungicide applications may be necessary to manage multiple diseases in a field because of selective activity, disease severity, and label restrictions. There are limitations on fungicide application timings; for example, heading restrictions on propiconazole fungicides or preharvest intervals.

You must read and follow the label. Also, check fungicide prices to determine the most cost-effective program, and if no disease is found, do not use a fungicide. For additional information and current disease control options, contact your local LSU AgCenter extension agent for information and advice.

Dr. Don Groth
dgroth@agcenter.lsu.edu

Provisia Variety - PVL01

The LSU AgCenter's rice variety development team at the H. Rouse Caffey Rice Research Station has been focusing on the development of the first rice variety to be used with the Provisia herbicide resistance system for the previous five years. This system is based on an induced mutant in rice that is resistant to quizalofop herbicide. This herbicide will kill conventional rice as well as Clearfield rice. This is important because the Provisia system will be an additional tool to control weedy (red) rice as well as weedy rice types and volunteer rice plants that have become resistant to the herbicides used with the Clearfield system.

The mutant was developed by BASF who will commercialize this technology. The mutant line was an indica type that did not have acceptable characteristics to be grown commercially in the southern U.S. The breeding program has been using conventional rice breeding techniques to move this trait into an argonomicaly adapted variety for Louisiana and southern U.S. production. The first Provisia rice variety will be PVL01. It is a semidwarf, early maturing long-grain rice line. The variety has good yield potential and excellent grain quality characteristics. It is being grown on approximately 1,200 acres in 2017 with the majority of this acreage for seed production. Plans are for this technology to be available on a limited scale in 2018. The herbicide (quizalofop) will also be marketed under the name Provisia and obtained a Section 3 registration for use in rice earlier this year.

Harvesting PVL01 increase

The addition of a second herbicide-resistant technology should extend the life of herbicide resistance in rice for many years and facilitate the control of weedy (red) rice for the foreseeable future.

Dr. Steve LInscombe
slinscombe@agcenter.lsu.edu

Provisia Rice A Tool for Weedy Rice Management

Provisia rice is a new herbicide-resistant rice, developed by BASF, which is currently being grown as seed rice. The LSU AgCenter Rice Breeding Program, under the direction of Dr. Steve Linscombe, was responsible for the development of the new rice lines currently being grown. This technology is based on a mutation in the rice by slow adaptation of the plant to increased levels of the herbicide Provisia. This is not a genetically modified organism or GMO, so it should be accepted much easier than GMO crops. The rice and the herbicide will both have the tradename Provisia. The federal label for the Provisia herbicide was granted earlier this year.

The active ingredient in Provisia is quizalofop. It was first labeled in the 1980s for use in soybean and in the early 1990s for use in cotton to control perennial and annual grasses. The tradename was Assure and later became Assure II. The mode of action of Provisia is an ACCase inhibitor that has a direct impact on fatty acid synthesis. Fatty acids are the primary component of the cell membrane. The cell membrane helps regulate individual cell structure, and allows for the selective movement of compounds in and out of the cell.

There has been some misconception on the proper adjuvant system to use with the Provisia herbicide. The Provisia label states, "use a Crop Oil Concentrate or an NIS [nonionic surfactant] as the adjuvant, but for best results use a Crop Oil Concentrate." In my opinion, it is best to use a high quality COC at 1 percent volume/volume percent, but I would strongly recommend 1 qt/A when GPA drops to 10 gallons or less. Under perfect conditions an NIS may be all you need, but if the weeds are under any stress, a COC is much more consistent. In my opinion, I would only use a high quality COC. The COC I use in my research is an 83 percent crop oil and 17 percent emulsifier/NIS. I prefer a COC that approaches an 80:20, the one I use is an 83:17. I prefer to avoid a COC that is in the 90:10 range because there is less emulsifier/NIS in the mixture than needed. There is also a common COC currently being sold that is a 60:40 blend. The directions indicate the product can be used at a lower rate of 1 pt/A. The problem with this is the amount of COC is too low in my opinion. In most instances, I have not evaluated every COC available. I tend to use one COC in all of my research because it is the same formulation I used when I first started graduate school in 1988. The product has not changed and it is a highly consistent product.

Provisia Rice

Weedy Rice

The major issue with the Provisia herbicide is the potential for antagonism when mixed with broadleaf and/or sedge herbicides. Mixing Provisia in combination with propanil-based products, Grasp, Grasp Extra, Regiment, or many other herbicides can reduce the activity of Provisia. This reduction can approach a 100 percent loss in activity of Provisia that can prevent acceptable weedy rice control. It is important to be very cautious when trying to mix other herbicides with Provisia. In my opinion, if a grower is going to use this technology, it will be used to help manage a weedy rice problem, and producers should make every effort to try to control weedy rice without outside interference. There are herbicides available that can be used later in the season to help manage broadleaf and sedge weeds. Get the weedy rice out first. I see this herbicide-resistant system being used in fields with a tremendous weedy rice issue. I would not chance the potential for antagonism. The only thing that needs to be in the sprayer is Provisia herbicide and a high quality COC. Keep it simple.

The Provisia label allows for a total use of 31 oz/A for a growing season. This would be equivalent to 15.5 oz/A followed by 15.5 oz/A, or 18 oz/A followed by 13 oz/A, or vice versa. It will be very important that producers follow a two application weed control program. I ask everyone, growers, consultants, and extension agents and specialists, to follow this program. Please do not try to control your weedy rice plants with one application. If a one-application program is followed, Louisiana rice fields will quickly develop weedy rice that cannot be controlled with Provisia.

If the Provisia system is used correctly, this technology can be used in combination with rotational crops, such as soybeans, and in rotation with Clearfield rice, to help manage weedy rice and many other difficult-to-control weeds. Provisia rice should never be used in a continuous rice production system, in other words, never grow Provisia rice in consecutive years. The Provisia rice and Clearfield rice can be around for years to come if the technology is not abused, but if we try to push the issue, resistance will soon follow.

Dr. Eric Webster
ewebster@agcenter.lsu.edu

This newsletter is produced by:

Karen Bearb
Bruce Schultz
Don Groth
Darlene Regan
Steve Linscombe
Valerie Dartez

H. Rouse Caffey Rice Research Station
1373 Caffey Road
Rayne, LA 70578
Phone: 337-788-7531
Fax: 337-788-7553
E-mail: slinscombe@agcenter.lsu.edu
www.lsuagcenter.com/en/our_offices/research_stations/Rice/

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Jason Hartman

It's been a little more than a year since Jason Hartman started working at the H. Rouse Caffey Rice Research Station as a research farm assistant, leaving a job in the oilfield.

"I'm glad I made the move," Jason said, looking back on his work at the station that started in March 2016.

He found out about the position while combing internet websites for job openings. At the time, he knew his welding work at a fabrication shop in New Iberia was about to end.

He said he had always read farming publications from the LSU AgCenter. "I told my wife it would be pretty cool to work for these people."

Three weeks after applying, he got the call from Dr. Dustin Harrell to start work in the agronomy lab.

Jason grew up in the Nunez community of Vermilion Parish, and he recalls being interested in farming, and he learned the basics from his cousins, neighbors and his dad, Ronnie Hartman. While attending Kaplan High School, he started a crawfish operation, even making his own crawfish boats and making traps. But the necessity to find work after graduating in 2006 led him to oilfield jobs.

"I always had a passion to farm. I never had the chance to go out and do it."

Jason said his job requires learning more than he ever imagined. "It's a lot of detail I didn't know existed in the rice industry. It's pretty neat once you learn how to do this stuff."

Dr. Harrell said Jason has been an asset to the rice fertility and agronomy project. "Jason had previous experience working on rice farms, so when he began here at the station, he hit the ground running helping us with our daily field activities, driving tractors, and fertilizing fields. He takes each given task with a smile on his face. He is a joy to work with."

Jason and his wife, Tiffany, are remodeling their home in the Meaux community, and he raises chickens and turkeys for eggs. In his spare time, he does lawn maintenance for neighbors, and he hunts, fishes and cooks.

Bruce Schultz
bschultz@agcenter.lsu.edu

Research partially funded by the Louisiana Rice Research Board **Research partially funded by USDA-NIFA**