Southwest Region

Rice Research Station News

Volume 5 Issue 3

August 1, 2008

Pest of the Quarter - Sprangletop

Sprangletop is in the genus *Leptochloa* with several different species found in Louisiana. The most common sprangletop found in Louisiana rice is Amazon sprangletop (*Leptochloa panicoides*). There are other less common sprangletop species found in rice. Neally sprangletop (*Leptochloa nealleyi*) looks similar to vaseygrass. Mexican sprangletop and bearded sprangletop are in the same species (*Leptochloa fusca*) but are listed by plant taxonomists under different sub-species. Mexican sprangletop is *Leptochloa fusca* ssp. *uninervia* and bearded sprangletop is *Leptochloa fusca* ssp. *fascicularis*. The sub-species designations are based on small differences and require a well-trained person to differentiate. Red sprangletop (*Leptochloa filiformis*) is common in Louisiana but is generally not found as often in fields under flooded conditions.

Amazon sprangletop seedhead

Amazon sprangletop is native to Brazil and red, bearded and Mexican sprangletop are native to North America. Amazon sprangletop was probably brought to the United States through the transportation of crop seed.

The sprangletop species that grow in Louisiana rice tend to have a wide range of germination times. Sprangletop can germinate in early April through August in Louisiana, and it has a limited ability to germinate under flooded conditions. This makes this weed a problem throughout the growing season.

Amazon sprangletop can grow to a height of 4 feet, and the color is light green, similar to red rice. It has flat leaves, usually smooth; however, the plant can have hairs along the leaf margins giving the plant a rough feel to the touch. The ligule is short and fat, almost square-shaped. The seed head is an erect spreading panicle 4.5 to 12 inches long, 1.5 to 3 inches wide with 40 to 90 branches 1 to 3 inches long

Bearded and Mexican sprangletop have a long pointed ligule. The ligule is one of the distinguishing characteristics when comparing bearded and Mexican to Amazon sprangletop. This species tends to be more pubescent than Amazon and grows slightly taller.

Seedling Amazon sprangletop with ligule

Sprangletop is found in every rice-growing parish in Louisiana and is quickly becoming a major rice production weed problem. Sprangletop became a problem in rice with the widespread use of Facet. In recent years, the development of Command as a soil applied residual herbicide, along with the development of the postemergence herbicides Clincher and Ricestar, has given producers some tools for the management of sprangletop.

Most rice weed control programs center around the control of barnyardgrass and red rice. But in the last few years with the development of new herbicides and Clearfield rice, weed control programs are focusing on sprangletop. Herbicides with residual activity on sprangletop are Bolero, Command and Prowl (and other pendimethalin

Cont. pg. 2

Special Dates of Interest:

2008 USA Rice Outlook Conference –Little Rock, AR

December 7-9, 2008

Rice Research Station Centennial Field Day

July 1, 2009

INSIDE THIS ISSUE:

Pest of the Quarter - Sprangletop

Cont.

formulations). There are several herbicides that can also provide postemergence activity on sprangletop. However, the herbicides labeled for use in the Clearfield rice production system can provide both preemergence and postemergence activity. Postemergence applications of propanil, Clincher, Ricestar or Bolero must be applied on small, actively growing sprangletop.

Producers should never rely only on postemergence herbicides. In most cases, a residual herbicide, if possible, should be added to postemergence application. However, be careful when mixing any herbicide with Clincher and Ricestar. Sprangletop is no longer a secondary pest in rice. Producers must be aware of previous sprangletop problems and select a weed management program that can provide control both from a residual and postemergence standpoint.

Dr. Eric Webster
ewebster@agcenter.lsu.edu

2008 Rice Disease Review

This year the fungus *Cercospora janseana,* which causes narrow brown leaf spot, failed to develop in south Louisiana. This is the second year in a row that it has failed to develop to a significant level in the first crop. In 2006, it caused severe damage. The disease is more severe as rice approaches maturity, and it caused damage in the 2007 second crop. Propiconazole containing fungicides (Tilt, PropiMax, Bumper, Stratego, and Quilt) have the best activity on this disease.

A number of tests have been conducted to determine the best activity against all stages of narrow brown leaf spot, and disease control and yield increases appear best when fungicides are applied between boot and early heading growth stages. The rate of propiconazole needed to control the disease is approximately equivalent to 6 ounces of Tilt, PropiMax or Bumper; 19 ounces of Stratego; or 21 ounces of Quilt. This rate for Tilt, PropiMax and Bumper is very weak against sheath blight, and the 21 ounces of Quilt has only 6 ounces of Quadris in it, which would also be weak against sheath blight. These fungicides will need added sheath blight fungicides to control sheath blight. The 19 ounces of Stratego has 6 ounces of propiconazole, and a full rate of Gem and should work well against sheath blight. Sheath blight developed late in 2008 because of dry conditions early in the year. Once weather conditions turned wet, sheath blight started to develop rapidly, and it was the most important disease in rice fields. All of the labeled fungicides have activity against sheath blight, with Tilt, PropiMax and Bumper having the weakest activity. A boot to heading application is usually best for sheath blight.

Blast failed to develop under normal cultural management conditions in 2008. However, there were several reports of severe blast developing where the flood was either delayed until tillering or green ring or lost during the season. If leaf blast develops, the best fungicide timing is at 50 to 70 percent heading with Quadris or Gem.

Since narrow brown leaf spot has failed to develop again for the second year, farmers need to concentrate on controlling sheath blight, their most important disease. Fungicide selection and timing should be directed at sheath blight control unless blast is present. The combination fungicides Stratego and Quilt both control sheath blight and narrow brown leaf spot, but rates must be adjusted primarily for sheath blight control. Since blast is such a devastating disease, fungicide applications should be delayed to heading and fungicides with blast activity should be used if this disease is present. Most times these later applications provide adequate sheath blight control. Remember, the best control for blast is establishing and maintaining an early flood, especially with susceptible varieties.

Dr. Don Groth
dgroth@agcenter.lsu.edu

Conventional vs. Reduced Tillage Practices in Rice

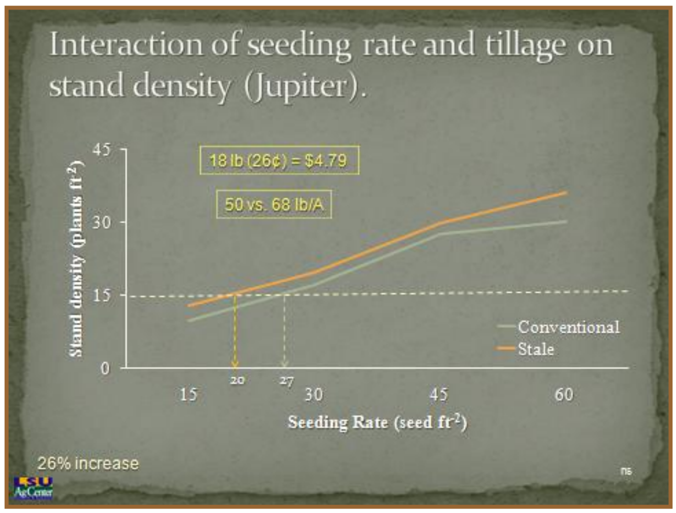
Conventional tillage is still the most dominant tillage system used in Louisiana rice production. However, reduced tillage practices such as a fall stale seedbed are becoming more popular each year. In fact, in the yearly Louisiana rice statistics information compiled by Dr. Johnny Saichuk, the average percentage of rice acres planted in a reduced tillage system has increased from 26% in 2003 to 42% in 2007. That comes out to over a 3% increase each year! If we were to break down the types of reduced tillage acres planted in Louisiana, we would find that approximately 78% of those acres are in either a fall or spring stale seedbed and the remaining 22% in a true no-till system. There are many reasons why reduced tillage systems are increasing in popularity in Louisiana. These include environmental benefits, economic incentives, potential for increased soil moisture at planting, decreased seedbed preparation time and reduced number of trips over the field at the time of planting, resulting in less time to get the crop in the ground when weather conditions are ideal.

Reduced tillage acres raises questions about optimum seeding and nitrogen (N) rates: Does the choice of tillage system change optimum seeding rates? Does the tillage system alter optimum N fertilization rates? To help answer these questions, two trials were initiated last year at the Rice Research Station South Farm on a Crowley silt loam soil. The objectives were twofold: 1) determine if optimal seeding rate differences occur between a fall-stale seedbed and a conventionally tilled seedbed and 2) determine if optimal N rate differences occur between the fall-stale and conventionally tilled seedbed. Treatments for the trials included four seeding rates (15, 30, 45 and 60 seed/ft^2) and four N rates (90, 120, 150 and 180 lb/A). The first test evaluated the long-grain variety Cheniere and the second evaluated the medium-grain variety Jupiter variety. Figure 1 shows how the completely randomized trial looked just after drill seeding.

The results from the first year of the Jupiter trial found that the stale seedbed had a higher plant density at the 3 to 4 leaf growth stage than the conventionally tilled seedbed at all seeding rates (Figure 2). In fact, if we were to estimate the seeding rate needed to achieve a plant density of 15 plants/ft^2 (our recommended plant population) from this data, it would take approximately 20 seeds/ft^2 with the stale seedbed and approximately 27 seeds/ft^2 with the conventionally tilled seedbed. On a pounds of seed per acre basis, that is approximately 50 lbs/A and 68 lbs/A for the stale and conventional seedbed, respectively. If we were to evaluate the seed cost differences (based on a cost $26 per cwt. of Jupiter registered seed), it would cost approximately $4.79 more per acre to achieve the optimum plant population using the conventionally tilled system.

Cont. pg. 4

Figure 2.



Interaction of seeding rate and tillage on stand density for Jupiter rice grown on a Crowley silt loam soil in 2007.

Figure 1.

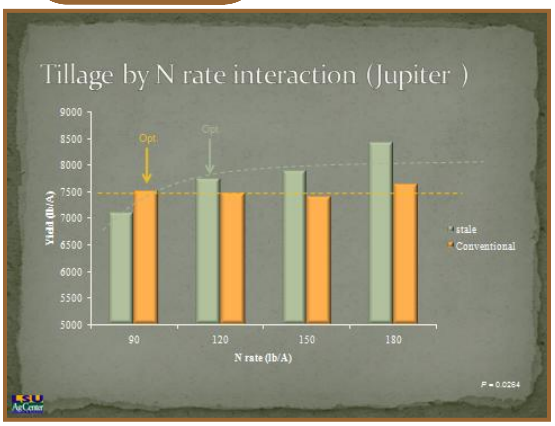
Completely randomized tillage treatments for the 2007 Jupiter trial just after drill seeding.

Conventional vs. Reduced Tillage Practices in Rice

Cont.

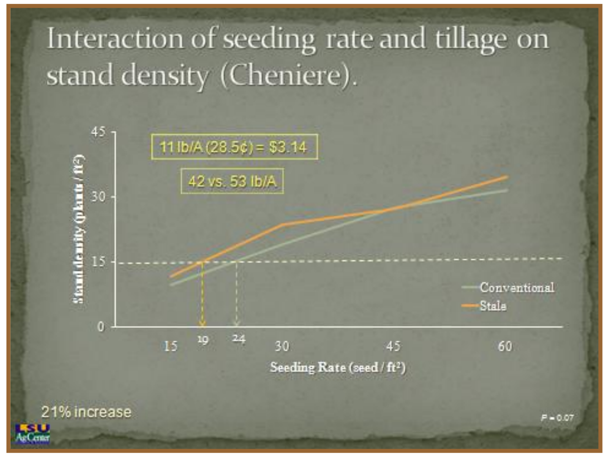
Similar results were seen from the Cheniere trial (Figure 3). We believe one of the main reasons the stale seedbed system had a higher plant population was due to the increase in available moisture at planting in the stale seedbed as compared to our conventionally tilled seedbed. Indeed, as you can see in Figure 1, our stale seedbed was very "clean" as far as weed control was concerned. A field in a stale seedbed that contains a higher population of larger weeds may have much different results.

Figure 4.



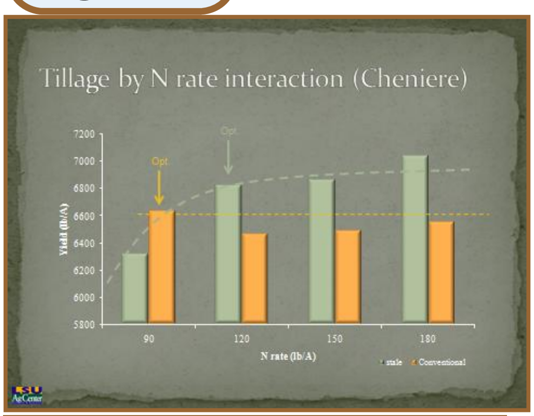
Interaction of tillage system and N rate for Jupiter rice grown on a Crowley silt loam soil in 2007.

Figure 3.



Interaction of seeding rate and tillage on stand density for Cheniere rice grown on a Crowley silt loam soil in 2007.

Figure 5.



Interaction of tillage system and N rate for Cheniere rice grown on a Crowley silt loam soil in 2007.

Figures 4 and 5 illustrate the N by tillage system interaction for grain yield from the two trials. Overall, yields from the conventionally tilled seedbed were not increased with N fertilizer rates above 90 lb/A. However, optimal yields were achieved in the stale seedbed system at a higher rate of 120 lb/A. With the high cost of urea today, there is no need in explaining what a 30 lb/A increase in N means financially in growing a rice crop. This increase in N needs between systems can be partially explained by the higher plant population we saw in the stale as compared to the conventionally tilled seedbed system. Another reason may be that the N uptake efficiency was less in the stale seedbed system. Of course, this second reason is purely speculative and beyond the scope of this study. Nonetheless, a definite N demand difference did occur between tillage systems.

From the first year of this study, we have shown that the tillage systems used in growing rice and the condition of the seedbed, in general, can drastically influence stand establishment and N demands. Because environmental influences such as weather patterns, weed and insect pressure can compound these differences, we will replicate this and our other tillage trials to assess results over time.

Dr. Dustiin Harrell
dharrell@agcenter.lsu.edu

FIELD DAY HIGHLIGHTS

FIELD DAY HIGHLIGHTS

Smooth Cordgrass Seed-Based Research Conducted in Collaboration with Rockefeller Wildlife Refuge Center

Seed-based revegetation of smooth cordgrass for coastal erosion control and remediation is being evaluated in cooperation with Rockefeller Wildlife Refuge. Current restoration practices involve clonal plantings that are both labor-intensive and costly. Labor requirements can range from 25 to 125 hours for planting sprigs, plugs or container plants per acre. In addition, manual digging and separating of the plants require 25 to 65 hours per acre. Depending on location, estimated direct and indirect costs of replanting salt marshes could easily reach $3,500 per acre. The seed-based propagation technique offers a new approach that will dramatically reduce the cost and improve the scale of restoration projects. Hundreds of acres can be planted in a day through aerial seeding at a fraction of the cost.

Preliminary studies on seedling establishment under greenhouse conditions were successful with the success rates comparable to that of rice plants. The highest success rates were obtained with early spring seeding. As the average temperature increases in the summer, the seeding establishment rates decreased. Current field studies at both the Rockefeller and Rice Research Station sites are under way to evaluate these seeding systems.

The seed from a polycross population developed through a random mating of 13 high seed producing elite lines were used in the field study. As a control, seed from the cordgrass variety Vermilion were used. To simulate aerial seeding, seed were broadcast from an airboat using a hand seed spreader. Smooth cordgrass seed was premixed with an oil absorbent. The test was composed of three seeding rates (22.5, 45 and 67.5 lb/A) in 20 x 42 ft plots with three replications. Data on growth parameters, such as seedling survival, seedling vigor, spread, percent of coverage, plant height and seed production, will be collected. The study will be repeated in the early spring of 2009.

Another part of the collaboration with the Rockefeller Wildlife Refuge will include aerial seeding applications in late February or early March of 2009 using polycross seed and seed collected from the wild. The aerial seeding research is funded by the Louisiana Sea Grant and CSREES Special Grant. The same seeding rates (22.5, 45 and 67.5 lb/A) will be applied. To support seed-based releases of polycross seed for future public use, the Syn-1 (the progeny of Syn-0 that refers to initial polycoss population) is also being evaluated in two locations - Rockefeller Wildlife Refuge and the Rice Research Station. Fifteen genotypes are being evaluated.

Smooth cordgrass is naturally highly sterile with seed production of less than 20% and a germination rate of less that 35%. The lines being developed have an average seed fertility of 56% with a germination rate of 82%. These ongoing research activities are part of continuing efforts to develop seed-based propagation technology to support large-scale erosion control and habitat restoration.

Direct seeding of polycross seeds from an air boat using a manual seed spreader.

Smooth cordgrass seedling establishment under green-house conditions.

The planting of progeny lines (Syn-1) at the Rockefeller site.

Dr. Herry Utomo
hutomo@agcenter.lsu.edu

Breeding for New Clearfield Varieties

To develop any new rice variety at the Rice Research Station, we must first develop new genotypes, or genetic combinations. We do this by making crosses between two different rice lines. Because the rice flower is perfect (contains both the male and female flower parts), we must artificially create a female flower. We do this by meticulously removing the male flower parts (anthers) from a rice floret. This tedious process is normally done by using a small pipette connected to a vacuum pump that vacuums the anther out of the flower. We can then introduce pollen from a different line and pollinate that (female) flower. When attempting to create a new Clearfield variety, at least one of the parents must contain the gene for resistance to imidazalinone herbicides.

The resulting seed from these crosses will contain genetic information from both parents. This seed is called the F1, and we will germinate these to produce F1 plants. These plants are normally seeded in the greenhouse and then later transplanted into the field. At maturity we harvest the seed from the F1 plants. This seed is bulk-planted the following growing season to produce a population of segregating F2 plants. Segregation means there is a great deal of variation in the appearance of these plants because they are expressing traits from both parents in many different combinations. Because these plants will normally also be segregating for presence of the herbicide resistance gene, we will spray these F2 populations with NewPath herbicide to kill those plants that do not process this gene.

Overall, selection in the F2 populations is a very important step in the variety development process. Breeders want to select those plants with the best combination of traits. We are often asked what we look for when making selections. The best answer is, "Everything." Examples include (but are not limited to) seedling vigor, maturity, height, tillering (number and uniformity), panicle size, completeness of panicle exertion, grain shape and appearance, disease resistance, and overall plant appearance. We will select individual panicles from those plants expressing the best combinations of the traits listed above for advancement to the next generation and beyond.

From this point on (F3-F?), most of the breeding material is grown as panicle (head) rows. A panicle row is a row of plants all coming from seed off a single panicle the previous generation. Also, from this point on, we will typically select the best rows (not individual plants) to advance to the next generation. Important to remember here is that each generation that we advance a line, the amount of segregation is decreased (or the level of uniformity is increased). Each year we will grow about 20,000 panicle rows of Clearfield material. Each one of these rows in each generation will also be sprayed with NewPath herbicide to eliminate this source of segregation. Each of these rows is a different genotype and any of them could theoretically become a new variety.

For most of our crosses, we have reached sufficient uniformity by the F4 to F5 generation to enter a line into initial yield evaluation. Those lines that are selected for potential yield evaluation are bulk harvested (after a selected number of panicles have been removed). Our bulk harvesting of individual rows is done the old-fashioned way. We harvest each selected row by cutting the stalks with a sickle. Those that make the cut after several lab tests during the winter will be entered into the Clearfield Preliminary Yield Testing Program.

Two replication tests are planted in late March/early April on the Rice Station. This will allow a sufficient growing season to evaluate first and ratoon (second) crop performance. A "plot" in the Rice Breeding Project is seven drill rows spaced 8 inches apart and is 16 feet in length (or approximately 75 square feet). This represents approximately 0.17% of an acre. A second set of this yield test is often planted at one of our off-station locations. In 2008, we have this test planted at our Evangeline Parish location near Mamou. These trials will also contain appropriate checks entries. In 2008, these include CL131, CL151, CL161 and CL171. We only include Clearfield lines as checks because these trials are also sprayed with NewPath herbicide.

Clearfield Preliminary Yield Test

Cont. pg. 9

Breeding for New Clearfield Varieties

Cont.

These trials are evaluated at least twice weekly during the growing season, and data is collected for the following traits: 1) emergence date, 2) seedling vigor, 3) tillering characteristics, 4) heading date, 5) plant height at maturity, 6) disease susceptibly (any diseases present), 7) lodging characteristics and 8) harvest maturity date. When a plot reaches harvest maturity, a hand harvested sample is taken for use in milling quality evaluation. This sample is cut with a sickle and then threshed using a stationary thresher, aspirated, then dried on our specialized sample drier. The sample is taken this way because the test will later be combine-harvested with our small-plot combine when all plots have reached harvest maturity. Since there may be up to 10 days difference in maturity among lines in these trials, taking a sample from each plot at harvest maturity puts all lines on an equal footing for milling quality evaluation.

Before harvest, Dr. Don Groth will evaluate all the plots for relative susceptibility to major and minor rice diseases. Because we often do not have consistent disease pressure in these tests, Dr. Groth will also plant each of these lines in disease nurseries where disease pressure is maximized by inoculation (sheath blight and bacterial panicle blight) and the use of highly susceptible spreader varieties (blast). When all lines in a trial have reached harvest maturity, the trial is harvested using a specialized small plot combine. This combine has a 6-foot header width so it fits these plots perfectly. The combine has the capability to harvest a plot, then automatically obtain the grain weight and grain moisture for the rice from that plot. The seed can then be bagged and tagged for identification. Under ideal conditions up to 500 plots can be harvested in one day.

In the late summer and fall, we will mill the hand-harvested samples, which will provide data on whole and total milled rice. In addition, these samples are evaluated for uniformity, chalkiness, grain shape and any other characteristic that might be a factor in the acceptability of the line as a commercial variety. We will then analyze the multitude of data collected to decide which lines will be entered into advanced trials the following growing season.

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% of lines entered into the Clearfield Preliminary trials will be advanced. The CA trials are conducted across the rice growing regions of Louisiana. In 2008, these tests are being conducted at the Rice Station and at off-station locations in Acadia, Evangeline, Jeff Davis, Richland and Vermilion parishes as well as a test at the Northeast Station in St. Joseph (in cooperation with Dr. Bill Williams). Since these trials are made up of conventional lines as well as Clearfield lines, they are not sprayed with NewPath herbicide.

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. It will also be provided to Dr. Eric Webster, who will evaluate these lines for differential response to selected rice herbicides. At each stage, these lines will also be evaluated by Dr. Groth for relative resistance or susceptibility to important rice diseases. 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 Clearfield varieties, it may also be grown as a larger headrow population as a step toward potential increase. (Remember that each line that is in these testing programs are also concurrently being grown as panicle rows for purification and increase in each generation in testing). 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 a foundation seed field on the Rice Research Station. The foundation seed production is under the direction of Mr. Larry White who works closely with the breeders through each step of increase and purification. Again, at each step described above, this material is sprayed with NewPath herbicide.

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 Director of the Louisiana Agricultural Experiment Station. If, after reviewing the data, the director agrees this is a candidate line for release, a committee will be appointed to evaluate the data and make a recommendation on the release. The final decision rests with the director.

In summary, the discussion above has summarized a process that takes six to seven years and an untold number of hours of meticulous work by a large number of people to accomplish.

Dr. Steve Linscombe
slinscombe@agcenter.lsu.edu

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/

This newsletter is produced by:
Karen Bearb
Bruce Schultz
Don Groth
Darlene Regan
Steve Linscombe
Linda Benedict
Frankie Gould

Focus on Research Associates

It just makes sense that Shane Theunissen would have a career as a research associate at the LSU AgCenter Rice Research Station.

"I grew up on a farm, and that's where my heart is," he said.

He started work at the station in September 2004. Before that he worked with Dr. Johnny Saichuk on the LSU AgCenter rice verification program for almost four years after graduating from the University of Louisiana at Lafayette with a bachelor's degree in environmental science in December 1999.

Theunissen works with Dr. Xueyan Sha in the long-grain and specialty rice breeding program. His work covers the entire spectrum of plant breeding – from making crosses, planting, entering data into computers and maintaining field records.

Harvest time has started on the research plots at the station, and that means he will be among the crews harvesting rice by hand and with harvest machinery. Even though it's hot, dusty work, Theunissen likes it.

"I find it the most rewarding. After all the preparation and planning, you get the final product and see what you have accomplished," he said.

When Theunissen isn't working, he shifts gears fishing, hunting, playing golf or spending time with his 21-month old girl, Claire. Occasionally after work, he helps his dad, Sam Theunissen, a farmer in Acadia Parish.

Theunissen said working in extension with Saichuk, learning more about different farmers' operations, and later in research has given him a well-rounded perspective. He said working with Sha on aromatic lines of rice has been rewarding, with the possibility that the work will result in a new variety.

"I'm glad to be here and to be a part of the breeding program to help farmers," he said.

Sha said Theunissen is a big asset to his program.

"Shane works very hard, and he is very dependable," Sha said. "I'm glad to have him on our team."

Research partially funded by the Louisiana Rice Research Board