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H. Rouse Caffey RICE RESEARCH STATION NEWS

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1909-2015
52 released varieties

Southwest Region
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Update on Fungicide Resistance

For at least 15 years, application of strobilurin fungicides azoxystrobin and trifloxystrobin has been the major control method for sheath blight. In 2010 and 2011, in an area near Mowata, sheath blight control with these fungicides was very poor, even after multiple applications. Several factors were examined, including sources of fungicides, application timing and methods, additives, water quality and unusual weather patterns. None of this information could explain the consistently poor fungicide performance. Isolated *R. solani* collected from these fields and tested for sensitivity to azoxystrobin, the active ingredient in Quadris and one of two active ingredients in Quilt fungicides showed that they were at least 10 times more tolerant of azoxystrobin than isolates collected both before strobilurin fungicides were commercially available. Azoxystrobin-resistant isolates were also resistant to trifloxystrobin, the active ingredient of Gem and one of two active ingredients of Stratego fungicides

The consensus had been that fungicide resistance in *R. solani* would not develop or would be slow to develop because traditionally, only one fungicide application was made per season. Also, *R. solani* reproduces asexually, and populations may therefore be less genetically diverse than those of a sexually reproducing pathogen. Unfortunately, because of increased fungicide use after the 2006 epidemic of narrow brown leaf spot (*Cercospora janseana*) on rice and the new threat of Asian soybean rust, *R. solani* populations were increasingly challenged by strobilurin fungicides. Resistance quickly developed and spread thereafter, causing rice farmers in this area to lose a major tool for sheath blight control. Unfortunately indications are that the strobilurin resistant *R. solani* continues to spread into new areas in south central Louisiana.

A Section 18 application for fluxapyroxad (Sercadis, a SDHI fungicide), which has a different mode of action than the strobilurins, was applied for in 2012. Sercadis is very effective against both the resistant and wild types of *R. solani* and received a full federal label in 2014. Soon after the makers of flutolanil (Elegia), which has the same mode of activity as Sercadis, also increased the use rate making it more effective against sheath blight. These compounds have been widely used in rice along with similar fungicides on soybeans for aerial blight (the same pathogen) for the last five years in resistance areas. In 2016 several sheath blight "nests" in a rice field in Acadia Parish were detected where Sercadis was applied. Samples were collected, the pathogen isolated, and tested for resistance to Sercadis. The fungus was found to be resistant to Sercadis and cross resistant to Elegia. It also had the resistance to the strobilurins. At this time further testing of additional isolates is being conducted, but the distribution and severity of this new resistant pathogen is unknown.

To avoid fungicide resistance only use fungicides when needed, use full label rates and rotate the mode of action (don't keep using the same fungicide over and over). A new fungicide maybe available in 2017-2018 called Amistar Top. One of its components has a different mode of action than the strobilurins or the SDHI fungicides and is effective against sheath blight. Just like the other fungicides, if we use it exclusively, resistance is likely to develop.

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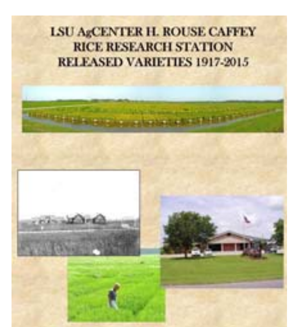
Sheath blight "nest" in rice field

Inside this Issue

Special Dates of Interest:

- **LA Rice Council/LA Rice Growers Association Joint Annual Meeting**
  Tuesday, February 7, 2017
  Jennings, LA
- **2017 H. Rouse Caffey Rice Research Station Field Day**
  Wednesday, June 28, 2017
  Crowley, LA



Click here to view released varieties

Rice Variety Development – Mid Stages

Rice variety development is a long-term research endeavor. It normally takes 3-4 years from when the initial cross is made to develop a new population, until superior progeny from that population are uniform enough to be entered into yield trials. The initial yield testing program, called the Preliminary Yield Tests, are primarily two replication tests, though a number of lines are evaluated each year in single plot tests. These trials are planted in late March/early April on the H. Rouse Caffey Rice Research Station. This will allow for 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 long (or approximately 75 square feet).

We use these small plots to keep the overall test as small as possible to minimize environmental variations that might have influence on the performance of genotypes (breeding lines) in the tests. In other words, we try to have any differences expressed in these trials (yield, milling quality, height, etc.) a result of true genetic differences and not caused by differences such as soil type, fertility or water depth.

Approximately three weeks after the preliminary yields trials are planted, we will plant a seed increase/purification block which will include 13 head rows from each of the lines included in the yield trial. This block is planted later than the test to provide time to analyze data after harvesting the yield trial to determine which lines may be advanced and thus which headrow populations should be harvested. Before harvest, these lines are evaluated. Any segregating rows are removed from the population, 25 panicles are picked from a representative row and then the remaining seed is bulk harvested. This will serve as a pure seed source for this line for further advanced testing.

A typical preliminary yield test block will have 375 entries (replicated twice) for a total of 750 plots on 2.5 acres. This test also includes the currently grown varieties so that the performance of the experimental lines can be compared to these as well as to each other. If everything goes without a hitch, this test can be planted in two hours with our specialized planting equipment. However, preparing the seed for this planting (cleaning, cataloging, weighing, labeling and filling seed envelopes, laying out packets in planting order, etc.) is the result of many months of meticulous work during the winter. In addition, there is a great deal of data entry and record keeping involved as lines move from one generation to the next. In 2016 we had over 1,400 new lines in the preliminary yield trials.

After planting, this yield trial is handled as any other rice field to optimize production and uniformity throughout the test area. This includes timely water management, fertilization, and weed and insect control. We do not use fungicides in the breeding program because relative disease resistance is evaluated at every step of the variety development process.

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, threshed using a stationary thresher, aspirated, and then dried on our specialized sample drier. This sample is taken this way because the test will later be 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 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 with a 6-foot header width to fit these plots perfectly. The combine has the capability to harvest a plot, then automatically obtain the grain weight and moisture for the rice from that plot. The seed can then be bagged and tagged for identification. Under ideal conditions, a 750-plot test 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.

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Field Testing - H. Rouse Caffey Rice Research Station

Preliminary Yield Test

Harvesting yield plots

Increase/purification field

Potential New Clearfield Jazzman Variety

Researchers at the H. Rouse Caffey Rice Research station have been working diligently to develop a Clearfield Jazzman line for Louisiana rice producers. The name Jazzman is a play on words for a Louisiana developed rice variety that is similar to jasmine-type rices. These types have a long-grain appearance but have cooking characteristics different from typical U.S. long grains. The jasmine types tend to cook softer, and the grains tend to cling together more after cooking. More importantly, these rices have a distinctive and pleasing aroma, considered by some to be similar to roasted nuts or popcorn. While the aroma is similar to that of the popular Della types familiar to many consumers, the cooking and taste characteristics of the jasmine types are very different. Currently, most of the milled rice that is currently imported into the U.S. are jasmine types, primarily from Thailand.

The rice station previously released two conventional jasmine types; Jazzman (2009) and Jazzman-2 (2011). These varieties have been successfully produced and are currently being marketed by several entities in Louisiana and elsewhere. However there is demand for a similar variety that can be used with the Clearfield herbicide resistance system.

The experimental line CLJ027 appears to have the characteristics to fill this need. The line has yield potential slightly lower than that of CL111 which has been the most widely grown rice variety in Louisiana for the past several years. CLJ027 also has the cereal chemistry characteristics that are needed for this specialty class. In addition, the line has excellent aroma and grain quality characteristics.

The line is currently being increased at the Puerto Rico winter nursery and should be harvested in mid-February. This breeder seed will be returned to the rice station and used to seed a five acre foundation seed production field next growing season.

Expectations are that this will provide ample seed production as well as limited commercial production during the 2018 growing season.

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Increase field of CLJ027
at the Puerto Rico nursery

Pest of the Quarter - Water-mold and Seed-Rot of Rice

When using the water-seeding method of planting rice, it is difficult to obtain uniform stands of sufficient density to obtain maximum yields. The most important biological factor contributing to this situation is the water-mold or seed-rot disease complex caused primarily by fungi-like *Achlya spp.* and *Pythium spp.* The disease is caused by a complex of these fungi-infecting seeds. The severity of this disease is more pronounced when water temperatures are low or unusually high. Low water temperatures slow the germination and growth of rice seedlings, but do not affect growth of these pathogens. In the1970s and 1980s, an average of 45 percent of water-planted seeds were lost to water-mold. In addition to the direct cost of the lost seeds and the cost of replanting, water-mold also causes indirect losses through the reduced competitiveness of rice with weeds in sparse or irregular stands.

Figure 1. Ball of fungal mycelium radiating our from rice seed.

Water-mold can be observed through clear water as a ball of fungal strands surrounding seeds on the soil surface (Figure 1). After the seeding flood is removed, seeds on the soil surface are typically surrounded by a mass of fungal strands radiating out over the soil surface from the affected seeds (Figure 2). The result is a circular copper-brown or dark green spot about the size of a dime with a rotted seed in the center. The color is caused by bacteria and green algae that are mixed with the fungal hyphae.

The fungus *Achlya spp.* normally attacks the endosperm of germinating seeds, destroying the food source for the growing embryo and eventually attacking the embryo, and *Pythium spp.* usually attacks the developing embryo directly. When the seed is affected by the disease, the endosperm becomes liquefied and oozes out as a white, thick liquid when the seed is mashed. If affected seeds germinate, the seedling shoots and roots are attacked and the seedling is stunted.

Figure 2. Fungal strands surrounding rice seeds on soil.

When infection by *Pythium spp.* takes place after the seedling is established, the plant is stunted, turns yellow and grows poorly. If the weather is favorable for plant growth, seedlings often outgrow the disease and are not severely damaged. The disease is less severe in water-seeded rice when weather conditions favor seedling growth. Temperatures averaging above 65 degrees favor seedling growth, and water-mold is less severe. Seeds should be vigorous and have a high germination percentage. Seed with poor vigor will be damaged by water-mold fungi when water seeded.

To reduce water-mold and seed diseases, seed should be treated with a recommended fungicide at the proper rate.

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Bird Repellents for Seeded and Headed Rice

After making your variety and hybrid rice selections, one of the next decisions you have to make is what seed treatments will be used on the seed. As you know, blackbirds can be a serious problem here in Louisiana, especially in early planted rice. In fact, a flock of blackbirds can devour a freshly seeded rice field in a matter of hours.

Fortunately, we do have one seed treatment that can be used to discourage feeding on rice seed by blackbirds. The product, AV-1011™, a bird repellent made by Arkion Life Sciences, is a liquid seed treatment that can be applied to rice seed. The active ingredient in AV-1011 is anthraquinone, and it is non-lethal to the birds and is actually found in 94 known plant species. When a bird eats a treated seed, it gives them digestive distress, and this is what deters them from eating more seed.

The suggested retail cost of AV-1011 in 2016 was $204.50 per gallon. AV-1011 is recommended at 18.29 fluid ounces per 100 pounds of seed. Therefore, if you are planting at a 25-, 50-, or 90-pound per acre seeding rate, it will cost you approximately $7.30, $14.61, or $26.29, respectively. Contact your seed distributor for exact pricing. The AV-1011 label, safety data sheet (SDS), and 2016 suggested price sheet are posted on the AgCenter's rice webpage and can be accessed directly with the following hyperlinks: label, SDS, price sheet.

The H. Rouse Caffey Rice Research Station is also working with Arkion and U.S. Department of Agriculture Wildlife Services researchers from Colorado in the development of an anthraquinone-based compound to repel birds from eating maturing rice. This work was conducted on the station during the 2015 growing season, and trials were also conducted the past two winters at the Puerto Rico winter nursery. While this product is still a while away from commercialization; research up to this point has been very promising.

Blackbirds have been known to devour a newly planted rice field in less than an hour. They can also pull up newly emerged rice seedlings and feed on the germinated seed as depicted in the picture above.

The AV-1011 label, safety data sheet (SDS), and 2016 suggested price sheet are posted on the AgCenter's rice webpage and can be accessed directly with the following hyperlinks: label, SDS, price sheet.

Blackbirds feasting on a mature rice field.

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Hybrid Breeding Update

Hybrid rice, produced from the first generation (F_1) of seeds between a cross of two genetically dissimilar pure line (inbred) parents, represents a relatively new option for Louisiana farmers. Commercial hybrids typically yield 10-20 percent more than the best inbreds grown under similar conditions believed to be the result of hybrid vigor or heterosis from crossing the two parents.

Six Louisiana candidate hybrids in 2016 showed high yield potential and good milling performance in the Commercial Advanced, Hybrid Yield, and Uniform Regional Nursery evaluated in Acadia, Evangeline, Jefferson Davis, Vermilion and St. Landry parishes.

Three hybrids in inoculated plots showed good to moderate levels of resistance against leaf blast, sheath blight, and bacterial panicle blight diseases in Evangeline, Jeff Davis, and Vermilion parishes.

During the 2016 Observational Trial, seven new hybrid combinations produced high grain yields, good milling performance, and low chalk. A new Provisia hybrid candidate showed high yield potential in the 2016 Observational Trial at the H. Rouse Caffey Rice Research Station.

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Long-grain Clearfield hybrid CLH161 evaluated in 2016 yield trial, H. Rouse Caffey Rice Research Station.

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Focus

Keith Fontenot

Keith Fontenot, retired county agent in Evangeline Parish, will be working in his second year with the Rice Verification Program.

Fontenot regularly checks fields and visits with farmers enrolled in the program. Last year, he worked with farmers participating in the Verification Program in Vermilion, Calcasieu, Concordia and Richland parishes.

In 2017, verification fields will be located in Richland, Cameron, Avoyelles, Morehouse and either East Carroll or Madison parishes.

This year, he said, the program may have at least one field of row rice in north Louisiana.

Fontenot started working with the Verification Program after he retired in 2016 as Evangeline Parish county agent after 38 years on the job. In 2015, he received the Rice Industry Award at the USA Rice Outlook Conference in New Orleans.

He said he likes working with the Verification Program because he interacts with farmers. "I enjoy working with the producers to make a good crop and to see the week-to-week changes in a crop, and I like helping farmers make decisions to make a crop and not spend too much money."

He said the program helps farmers make a profit, as well as teach them how to improve their abilities at growing rice.

The Verification Program demonstrates the importance of getting things done on time, Fontenot said. "It teaches them the importance of timing and looking at the growth stages of the rice. Not just doing something because their neighbors did it, but doing it because the rice is approaching the growth stages."

Dr. Dustin Harrell, LSU AgCenter rice agronomist and extension specialist, said Fontenot is a valuable resource for the Verification Program. "Keith has done an exceptional job with the Rice Verification Program. He has a wealth of experience with rice production from the years he put in as the agricultural extension agent in Evangeline Parish."

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