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H. Rouse Caffey RICE RESEARCH STATION NEWS

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1909-2017
54 released varieties

Southwest Region

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Rice Variety Development Update

A new Provisia herbicide-resistant line, PVL108, is being purified and increased over the winter at the nursery in Puerto Rico. PVL108 is being considered for a commercial release in 2020. PVL108 is a sister line to PVL01 and has the same parentage of Cheniere crossed with the BASF Provisia donor line. Compared to PVL01, PVL108 has demonstrated improved yields, milling, blast resistance, and shorter maturity. It has a shorter grain length, is taller, and has similar low levels of chalk.

Over four years (2015-2018) of multi-location yield testing, PVL108 has averaged a yield advantage of over 8% more than PVL01. In 2018, PVL01 performed at a similar level to PVL108, as PVL01 demonstrated improved performance in 2018 compared to previous years. One potential explanation for this was there was relatively low blast pressure in 2018 and PVL01 is quite susceptible to blast disease. Improved blast ratings have been observed in the nursery and are attributed to the presence of the Pikm blast resistance gene that was identified in PVL108 based on DNA markers.

Across five locations and 10 trials in 2018, the average yield of PVL108 and PVL01 was 7,960 lbs/A (49 bbls) and 7,604 lbs/A (47 bbls), respectively. This is compared to 8,100 (50 bbls) and 8,320 lbs/A (51 bbls) for Cheniere and CL153, respectively, in the same trials. Additionally, PVL108 has consistently demonstrated an improved ratoon yield over the last three years, with an average ratoon yield advantage of 20% over PVL01.

PVL108 has a similar heading date as CL153 and Cheniere, which is about 7 days earlier than PVL01. PVL108 is about 42 inches tall, which is about 5 inches taller than PVL01. The increased plant height might result in PVL108 being more prone to lodging; however, we have yet to observe lodging of PVL108 in our breeding trials.

Both PVL108 and PVL01 have typical southern U.S. long-grain cooking characteristics, with intermediate amylose and gelatinization temperature. Both lines exhibit low chalk and are consistently among the lowest chalk lines compared to all the other varieties on the market. The grain length of PVL108 is 6.5 mm, which is significantly shorter than the very long grain of PVL01 (>7 mm).

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Special Dates of Interest:

- **Rice Outlook Conference, December 5-7, 2018**
- **Acadia Rice Production Meeting, January 3, 2019**
- **H. Rouse Caffey Rice Research Station Annual Field Day June 26, 2019**

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Cont.

CONVENTIONAL

A conventional long-grain line, 1702140, was tested for a second year of multi-location testing. This line is derived from a cross between two widely grown conventional long-grain varieties, Cheniere and Mermentau. It demonstrated strong yields across five locations in 2018, with an average yield of 8,650 lbs/A (53 bbls), out-yielding CL153 and CL111 by 5% and Cheniere by 8%. Similarly, 1702140 averaged a 10% yield advantage over Cheniere in 2017. It is very similar to Cheniere in terms of maturity, height, disease resistance, and milling and has a similar amylose content as Mermentau. In 2019, it will continue to be evaluated in advanced testing across Louisiana and neighboring states, and if it demonstrates similar performance, it could see a limited release in 2020. An initial seed increase and purification of 200 panicle rows was recently planted in Puerto Rico.

1702140

CLEARFIELD

Two Clearfield herbicide-resistant long-grain lines were tested for a third year in advanced yield testing. Lines 1602195 and 1602097 have both demonstrated average yields at or slightly over CL151 and CL153 over three years of testing. In 2018, across seven locations in Louisiana, 1602195 and 1602097 averaged a yield of 8,350 (52 bbls) and 8,740 lbs/A (54 bbls), respectively, compared to an average yield of 7,950 lbs/A (49 bbls) for CL153 and CL111.

Both lines offer strong blast resistance and contain the broad spectrum blast resistance gene Pita. Based on grain quality parameters, 1602195 is being prioritized as a potential variety release over 1602097. Line 1602195 has a similar grain length as CL153 (6.8 mm) and slightly higher levels of grain chalk. Initial purification of both lines is underway, and upon approval for release, one of these lines could be released in 2020.

1602195

1602097

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Breeding For Seed-Based Coastal Plants For Aerial Applications

The Louisiana coastal marsh is one of the most productive estuarine ecosystems important to Louisiana's economy and to the life and culture of many people who depend on this environment. Every year, approximately 16.5 square miles of coastal land disappears, one of the fastest rates of marsh losses in the world. At the current rate, an additional 513 square miles will be lost by 2050, resulting in an estimated loss of more than $37 billion in public resources and services. The LSU AgCenter coastal plant project is working on improving the coastal marsh plants, smooth cordgrass and California bulrush, to support large scale planting using an airplane.

Aerial application is a practical solution for rapid large-scale planting and revegetation for erosion control capable of reaching out to the most remote and isolated coastal areas difficult to reach by land vehicles or boats. The LSU AgCenter coastal plant project focuses on three major components, 1) developing genetically superior, high seed-producing, and well-adapted coastal plant cultivars; 2) developing seed coating technology that protects, stabilizes, anchors, and helps the seed establish itself rapidly under harsh coastal conditions; and 3) establishing effective aerial seeding methodologies suitable for a large-scale revegetation. Superior seed producing, smooth cordgrass breeding lines have been developed through many years of selections and trials. Promising polycross populations composed of four, five, and six selected parental lines are currently undergoing final testing for releases. The first polycross population was developed using 15 genetically diverse lines. The average seed set of the polycross population was 58.5%, with an average germination rate of 82.2%. In comparison, the Vermilion cultivar that was grown adjacent to the polycross plots had a seed set of 20.6% with a germination rate of 35, which was significantly less than the polycross seed. The new polycross populations are developed using fewer parental lines selected for their high capability to produce polycross seeds and a high degree of genetic diversity.

Recently, three salt-tolerant California bulrush plant materials were deposited in the National Plant Germplasm System and currently are in the process of registration, LABR275 (PI 679591), LABR281 (PI 679592), and LABR284 (PI 679594). In moderate brackish coastal marshes, LABR275 had 53.7 tillers, about twice as much as the cultivar Restorer. LABR284 had a spread of 42 square feet, close to four times larger than that of Restorer. LABR281 also had an excellent spread, averaging 37 square feet. In the freshwater environment, LABR275 had the largest spread at 98 square feet, while LABR281 had the highest number of tillers (124.9) and was the tallest at 67 inches. Improved salt tolerance and superior agronomic performance found in these three germplasm will open a new opportunity to expand the utility of California bulrush from freshwater to moderate brackish marshes near coastal areas to accomplish many objectives, including erosion control, shoreline protection, and rapid stabilization of newly created marshes. Their other characteristics as a habitat builder and remover of industrial and agricultural pollutants could provide additional benefits to the environment.

To overcome the dynamic and rapid micro-environmental fluctuations in the coastal areas, specific seed treatment and seed coating methodologies are needed. The goals of the research in this area are to 1) provide a protective buffer from excessive temperature and direct exposure to high wind and temporary extreme dryness; 2) condition the seed to be less palatable to birds or other seed eating animals; and 3) provide physiological and physical support to allow for rapid seedling development and help the seedling to quickly anchor and establish itself under harsh coastal conditions. Components with specific functions are being evaluated for incorporation into the seed pelleting. For example, water-absorbing materials are added to the pellets to absorb moisture and help the seeds that land on the higher soil elevation with less exposure to water during low tidal cycles to be able to survive and grow. A chemical compound called a tackifier is added to the pellet to help it attach to the soil better.

Extensive aerial seeding on newly constructed marshes in several places in Marsh Island and Belle Chasse has been conducted. The aerial applications established healthy vegetation in a single season and, therefore, can be used to deliver rapid stabilization. The aerial seeding will be conducted further using genetically improved polycross seed and special seed treatments to obtain more successful coastal marsh revegetation.

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New plots of coastal plants at the Rice Research Station

Advanced smooth cordgrass line at the Belle Chasse testing site

High-Protein Rice, Change in Cooking Texture

The LSU AgCenter Grain Quality Program continues to work on high protein in the grain and uses it to further increase other grain qualities. An increased content in the rice grain protein has not only changed the grain chemistry but also cooking textural and liquid paste properties of the rice grain. Frontière is a non-GMO and the first high-protein rice cultivar developed for commercial applications anywhere in the world. It was developed from conventional mutational breeding. Our project successfully obtained a patent for a high-protein cultivar, granted by the U.S. Patent and Trademark Office on Feb. 13, 2018, as Patent No. 9,888,637 B2. It is registered as CV-150, PI 647794, with PVP No. 201500310. It has an average grain protein content of 10.6%, a 53% improvement from its original protein content. Cultivar Frontière is adapted to the rice growing areas in Louisiana and has shown consistently higher grain protein content throughout multi-location trials in Louisiana and other places including when it was planted in the Puerto Rico winter nursery.

High-protein rice yields high interest among the health conscious. While high-protein rice is gradually finding its way to U.S. consumers, there are hundreds of millions of people around the world who depend on rice in their diet, but their access to meat and other sources of protein is limited by availability and cost. High-protein rice, where the production can readily be scaled-up as needed, can be used to help ease this world problem.

No cultural practice adjustment is needed to grow Frontière. Its cultural practices follow the recommendation previously set for Cypress. With a typical yield of 5,400 lbs of rough rice or 3,500 lbs of milled rice per acre, planting high-protein rice will result in about 330 lbs of additional protein per acre. The additional amount of protein obtained per acre is equivalent to the amount of protein obtained from 1,140 lbs of meat or 1,200 gallons of milk.

The LSU AgCenter Grain Quality Program is working on the second generation of high-protein rice lines to further improve both yield and the grain protein content to approximately 15%. In the last growing season, promising lines with protein contents ranging from 12-15% have been evaluated in preliminary yield and headrow replicated trials. Since increased protein changes the textural and liquid paste properties of rice grains, analyses of these aspects are being carried out to direct selection to focus not only for the high protein but also for other specific cooking qualities associated with the elevated protein content. Deviation from a typical cooking texture of rice into what is normally found in other grains, such as wheat or oat, may provide a new opportunity for high-protein rice to extend its use as a new alternative product in the baking industry.

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Cahokia field

Cahokia rice salad

Cahokia rice truffle

Cahokia rice cranberry pecan salad

photo credit to Cahokiarice.com

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Focus

Justin Sarver

Justin Sarver started working at the Rice Research Station in August 2017 in the hybrid breeding project.

He later transferred to the maintenance department where he can apply his mechanical skills repairing and maintaining a wide variety of equipment. One day he might fix a broken window and the next day could find him tearing down a diesel engine to replace a piston.

Justin grew up in the Ebenezer community on a rice-crawfish-soybean farm run by his father, Chris Sarver.

He started crawfishing after hours from Notre Dame High School in Crowley. “I would get off at 3 in the afternoon and get in a boat and sometimes fish until dark.”

He went to Notre Dame High School and knew he would have an agriculture-related career. “I figured I’d stay close to it.”

Justin learned welding at the South Louisiana Community College in Crowley, developing his skills under instructor Darryl Bouillion, father of Valerie Dartez, administrative coordinator at the Rice Research Station. He became a full-time welder working for an offshore company, and he farmed full-time with his father before taking the job at the Rice Research Station.

He still has an agricultural enterprise, farming crawfish on about 100 acres and a herd of 20 head of Braford and Brahma cattle, along with sheep and chickens.

Justin has four children, ages 10, 4, 3 and 1 month with his wife, Megan Sarver.

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