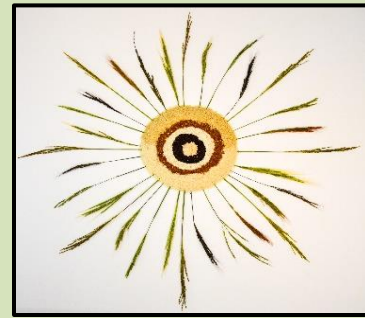




Dale Bumpers National Rice Research Center  
USDA-ARS  
Stuttgart, Arkansas



SEPTEMBER 2022

## MONTHLY RESEARCH HIGHLIGHTS

For More Information: Dr. Yulin Jia, Acting Research Leader/Center Director  
[yulin.jia@usda.gov](mailto:yulin.jia@usda.gov)

### Recent Scientific Publication

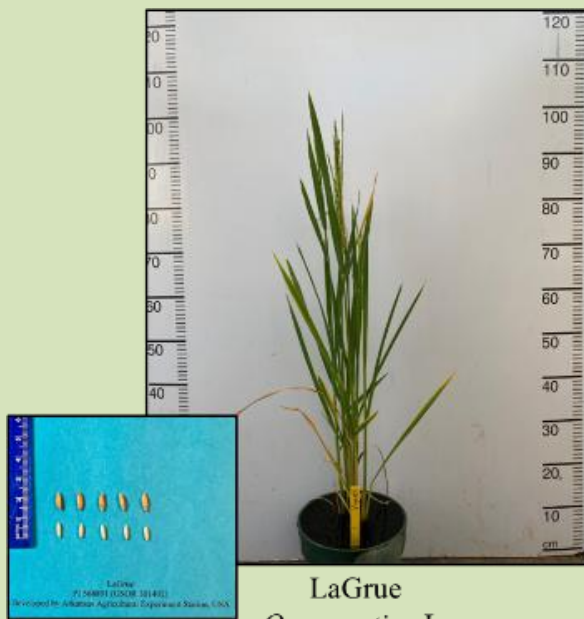
*This addresses USDA-ARS Research Goal: Crop plants with resistance or tolerance to diseases and pests*

**Eizenga, G.E., Li, D., Jia, M.H., Huggins, T.D., Jackson, A.K.** 2022. Identification of sheath blight QTL in a LaGrue x *Oryza nivara* rice advanced backcross population. *Euphytica*  
<https://doi.org/10.1007/s10681-022-03101-0>

Sheath blight disease, caused by the *Rhizoctonia solani* fungus, is one of the most prevalent fungal diseases of cultivated rice and results in significant economic damage to rice production worldwide. No source of complete resistance to sheath blight disease has been identified in cultivated rice (*Oryza sativa*). The wild *Oryza* species, which are closely related to cultivated rice, are a potential source of important traits including new resistance genes to fight pests like sheath blight disease. *O. nivara* is a wild ancestral species that can be successfully crossed with cultivated rice. The objective of this study was to identify the chromosomal location(s) of possible sheath blight resistance gene (s) in an *O. nivara* accession that previously demonstrated moderate resistance to sheath blight disease in greenhouse studies. The goal of this study was to identify these potential resistance genes and transfer them into the popular southern U.S. long grain variety, LaGrue, which is susceptible to sheath blight disease. One major chromosomal region on the distal region of chromosome 9 was associated with the sheath blight resistance contributed from the *O. nivara* parent. This region was previously identified in cultivated rice but the *O. nivara* species may have a novel resistance gene which can be used in the development of elite rice varieties that will decrease crop vulnerability to this important disease.



*Rice sheath blight disease in an Arkansas field*



**LaGrue**  
*Oryza sativa* L.  
Developed by Arkansas  
Agricultural Experiment Station



*Oryza nivara* Sharma et Shastry  
Collected in Phitsanulok, Thailand

Plant and seed images of the rice cultivar LaGrue (*O. sativa*) (left) and ancestral *O. nivara* parent (right) crossed to develop the advanced backcross QTL mapping population for mapping sheath blight resistance genes. (Rice plants exhibiting sheath blight disease in the field on the right.)

- **Technology Transfer**

- ✓ **Interactions with the Research Community**

On September 30, Dr. Mena Souliman of University of Texas at Tyler presented a virtual seminar titled 'Impact of Rice Husk on the mechanical and mechanistic performance of hot mixed asphalt mixtures' to DB NRRC scientists and staff members. Subsequently, potential collaboration on utilization of rice by products for pavement was discussed.

- ✓ **Rice Germplasm Distributed**

During the month of September, 483 rice genetic stocks were shipped to researchers in the United States.

- **Education and Outreach**

Clear blue sky as far as the eyes can see, only the radiant sun breaking up the cloth of cerulean overhead. Warm sand everywhere, and I mean everywhere it could be. I still have an aversion to sandy locations, and mangos but that's another story for another time.

Well let me introduce myself, I am **Jeffrey Girton**, the new maintenance guy at Dale Bumpers National Rice Research Center. I've been around for about a year and as such I have found this location a much better place than some of my previous work locations. I started my contract with the United States Army back in July of 2001 and as such got to see many exotic locations, hot, sandy, dusty, explodey (yes that's a word) locations. These few years of my life, well about 7 of them, had taught me a few skills that I use from time to time today. These skills are I can sleep just about anywhere, environmental adaptability and the ability to eat about 1/10<sup>th</sup> my body weight in a single sitting. With three combat tours under my belt, I decided that I had enough of this travel agency. I threw a dart and ending up moving to the Seattle area and thus I started my civilian life again while still doing the part time army thing in the National Guard. I picked up a job with the Department of Homeland Security as a maintenance worker. This was in early 2009 and I pretty much stayed there till 2021, I had a short break in 2013 as I once again went to visit the oh so wonderful beach in the Middle East. Seattle began to grow and seemed to become a large city way to quickly and as such I wanted to move back to a more rural area. While not the small town of my birth this place does seem nice even if the deer are a bit smaller. One last thing, if you need something fixed, please don't bribe me with donuts, cookies, or zucchini bread, I am trying to not get a dadbod as I do not meet the prerequisites



**Javier Delao**, maintenance worker at the Dale Bumpers National Rice Research Center was born in California and was raised by an Air Force military dad who was relocated to various bases every four years. Javier saw a lot of the world such as Japan, Spain, and Wyoming. When his dad finally retired and moved to California, Javier started mid-semester in school. After completing high school, Javier graduated from college and earned a two-year associates degree then enlisting in the military like his dad. Enlisted as a logistics person in the Air Force, his first assignment was in Wyoming and Javier oversaw the tracking missile crews that departed the base heading to their assigned locations which took anywhere from 30 minutes to 2 hours of driving time, ensuring their arrival for their assigned duty site, and tracking the returning crew back to base. Javier received numerous awards for upgrading the tracking method. This upgrade was crucial when there was an accident or when bad weather stopped the crews from reaching their destinations. While stationed in Germany, Javier supervised the tracking of personnel and cargo movements, receiving accolades from the base commander for knowing where things and personnel were at any given time. Later, he transferred to a mobile aerial port unit where he learned to jump from airplanes and pack parachutes for numerous applications for personnel and for cargo. Javier acted as a loadmaster for humanitarian tasks which took him to different parts of the world such as Russia, Turkey, and Italy. After receiving orders to be stationed in California, he was transferred from his current duty assignment to help another unit. The Civil Engineers were happy to see their replacement ahead of schedule. Javier supervised and was responsible for over 100 military vehicles and 20 GSA vehicles. During this time, he learned numerous trades such as electrical, pest animal control and some HVAC systems repairs. Four years later, Javier was stationed at the Little Rock Air Force Base, and after completing 20 years, Javier retired and raised two beautiful girls. One daughter is a Chef for several upscale hotels around the United States, and the other daughter is a Court Stenographer and a Hand Signer for the deaf in the courts system.

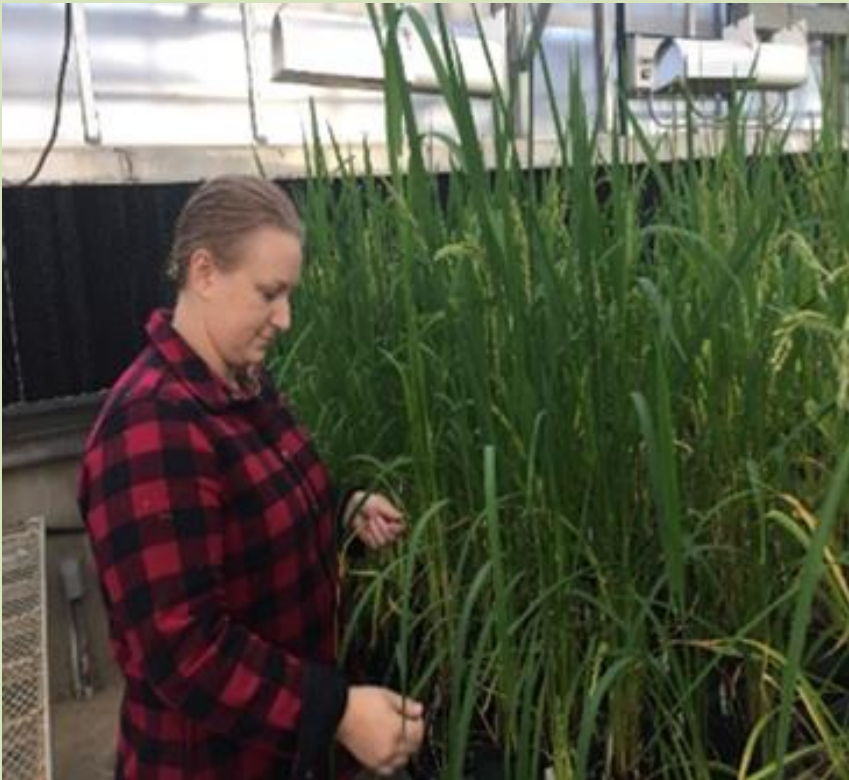


Javier volunteered to be the soccer coach for his daughter's team while they were at Jacksonville High School. During his tenure as coach, Javier improved the teams winning 2 games per season to winning all but one. This achievement placed the girls' soccer team high on the leader board and going to state every year.

**Alex Humphries** grew up in Arkansas County. He graduated from DeWitt High School with honors. Alex poured and finished concrete for 6 years in and around central Arkansas. Alex framed houses and did remodels for 5 years in north central Arkansas and in Missouri. He worked at DBNRRC under Dr. Shannon Pinson assisting with genetic research, including greenhouse and field, made several successful crosses between different varieties of rice. Alex is now a part of the maintenance team at DBNRRC. He is a member of the Almyra Volunteer Fire Department. In his spare time, he enjoys spending time with his family.



**Kristina Trahern** received a Bachelor of Science degree in Biological Sciences from Arizona State University. Before joining Dale Bumpers National Rice Research Center (DB NRRC), Kristina worked seasonally for multiple agencies of the federal government from 2010 until recently. From August 2020 to August 2022 Kristina worked as a Biological Science Technician in the Molecular Plant Pathology Lab of DB NRRC under Dr. Yulin Jia's supervision. Her work has been a part of a National Science Foundation funded project titled "Characterization of genomic basis of weedy rice competitiveness" led by Dr. Ken Olsen, Professor of the Biology Department in Washington University St. Louis in collaboration with Dr. Ana Caicedo, Professor of the Biology Department, University of Massachusetts Amherst, and Dr. Christopher Topp of Danforth Plant Center, St. Louis. The objectives of her project were to develop rice and pathogen genetic materials for the team members to use. Her duties included advancing two weedy rice recombinant inbred lines, isolating blast (*Magnaporthe oryzae*, *Mo*) from field samples, and characterizing genetic diversity of blast isolates using avirulence gene and simple sequence repeat markers. She has completed the advancement of two mapping populations and characterized 200 blast isolates for subsequent team investigation. Additionally, she has been extremely helpful for team harvesting, seed processing and preparation of numerous in-house projects.



**Dr. Aron Osakina** developed a passion for Biology in high school, this got prominent when he joined Jomo Kenyatta University of Agriculture and Technology in Kenya to study biochemistry and molecular biology. It is here that Aron felt like he had to explore more in molecular biology research. To do this, he had to get a university globally where molecular biology research is well established, he had tried several applications in Europe, but did not get in because they were only offering partial scholarships which he could not afford. Aron therefore had to look for a university that offered full scholarship. Fujian Agriculture and Forestry University (FAFU) in China, offered this golden opportunity in the year 2014, where he enrolled for the master's degree in biochemistry and molecular biology. At FAFU Aron's research for the master's degree thesis was developing a conditional gene expression system titled the Tetracycline inducible promoter systems for the fungus *Flammulina velutipes*. This was the first time this system was being developed in edible fungi and it involved application of molecular cloning and microscopy techniques to achieve the objectives.



Upon graduating with his master's degree in the year 2017, Aron felt he should transit directly to the doctoral program. Aron wanted to be involved in a research program that would be beneficial both to his country and globally. Aron realized that rice is one of the most consumed foods in Kenya and worldwide. Since rice production continues to be threatened by the world-renowned cereal killer, *Magnaporthe oryzae*. Aron decided that his doctoral research will explore the molecular mechanism of rice blast fungus. Luckily, at FAFU one of the Professor (Zhonghua Wang) was working on rice fungus *M. oryzae*. He therefore joined the research team. At FAFU Aron doctoral research thesis was titled 'Understanding the role of arginine, glutamine and purine nucleotide metabolism in development and pathogenesis of rice blast fungus. The study entailed generation of mutant stains using homologous recombination approach and phenotype characterization. They established that nutrient biosynthesis is indeed a crucial process in development and pathogenesis of rice blast fungus and can be explored in the development of antifungal agent against rice blast.

After graduating with his doctoral degree at FAFU in 2021, Aron secured a part time teaching position at Egerton University, where he was teaching Plant Pathology, Biochemistry and Molecular Biology courses. Currently, Aron is a Postdoc Research Associate of Washington University at St Louis who conducts his research at Dale Bumpers National Rice Research Center under Dr. Yulin Jia's supervision through the same grant supported Kristina Trahern. Aron is focused on understanding how weedy rice has evolved its competitiveness against *M. oryzae*. Aron is certain that this post doctorate program will broaden his knowledge in plant-pathogen interaction in preparation for his next assignment as a plant pathologist.

See the web version of all DBNRRC research highlights at: <https://www.ars.usda.gov/southeast-area/stuttgart-ar/dale-bumpers-national-rice-research-center/docs/monthly-research-highlights/>