



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



FEBRUARY 2019

MONTHLY RESEARCH HIGHLIGHTS

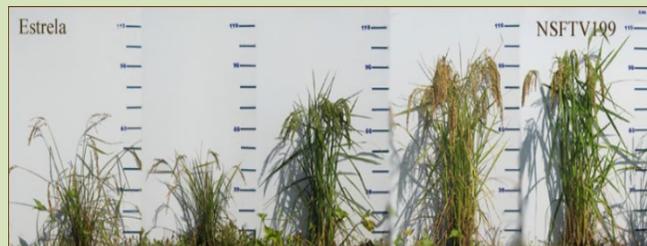
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- **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Enhanced knowledge of how growth and development of crop plants are controlled at the genetic and molecular levels

Eizenga, G.C., M.H. Jia, A.K. Jackson, D.L. Boykin, M. Liakat Ali, E. Shakiba, N.T. Tran, S.R. McCouch, and J.D. Edwards. 2019. Validation of yield component traits identified by genome-wide association mapping in a *tropical japonica* × *tropical japonica* rice biparental mapping population. *Plant Genome* 12:180021. doi: 10.3835/plantgenome2018.04.0021

To meet the growing demand for food, it is essential to understand the genes in plants that control grain yield and to use this information to expedite breeding efforts to develop new cultivars. The genetic control of yield in rice is determined by several factors including number of panicles per plant, number of seeds per panicle, and seed size. Most rice grown in the southern United States is derived from the *tropical japonica* genetic subpopulation and is of particular interest to U.S. breeders. A global collection of over 400 diverse rice varieties was evaluated for traits related to panicle architecture and seed production. Subsequently, two diverse *tropical japonica* varieties, Estrela and NFTV199, were selected from this collection, crossed, and 256 progeny were genotyped using 132 DNA markers as well as characterized for yield component traits. Some 40 possible chromosomal regions were identified that were associated with these yield components. However, to make this useful for breeding, new, more closely linked DNA markers are being developed to accelerate selection for improved yield and grain shape.



- **Technology Transfer**

- ✓ **Interactions with the Research Community**

On February 1st, Dr. Shannon Pinson provided an overview of State and Federal public rice research in Arkansas to Dr. Scriven Bernard, a research coordinator with Italtollina

USA, Inc., a company headquartered in Anderson, Indiana, which produces organic fertilizers, biostimulants and beneficial microbials. Dr. Pinson facilitated connecting Dr. Bernard with Dr. Jarrod Hardke, a University of Arkansas Extension Scientist, and plans were made to begin collaborative research in the summer 2019.

On February 6-8th, Dr. Ming-Hsuan Chen and Mr. Jace Everette provided training and detailed protocols on rice grain quality analysis to a visiting Ph.D. student from Texas A&M University.

On February 18th, Dr. Anna McClung was contacted by a research/extension agent at University of Massachusetts working with cranberry farmers interested in rice being used as an alternative crop. Dr. McClung provided suggestions of possible rice varieties for growing.

On February 19th, Dr. Yulin Jia provided one isolate of the sheath blight pathogen to a researcher at Louisiana State University in Baton Rouge, LA to study disease suppression in rice by varying nutrient regimens.

The 39th meeting of the Rice Crop Germplasm Committee (CGC) was held on Feb. 20th as a virtual meeting. This is one of 42 CGCs that provides an opportunity for researchers and private industry to interact with the National Plant Germplasm System (NPGS) in regards to crop germplasm issues. Reports were given by five ex-officio members involved with these activities, Drs. Peter Bretting, Gary Kinard, Harold Bockelman, Martha Malapi-Wight and Anna McClung, all with ARS. Report highlights were: 29 accessions, including 25 weedy red rices, were added to the NSGC collection; efforts are underway to identify an endornavirus found in 18 accessions imported from Trinidad; interviews for the rice curator position at Stuttgart were underway; and the GSOR (*Genetic Stocks-Oryza*) now holds 37,942 accessions with 176 orders being filled in 2018. Dr. Jack Okamoto led a discussion on managing rice accessions that were gene edited or had genetically modified (GMO) traits, if such accession(s) are contributed to the NPGS rice collection in the future.

During February 21 – 25, Dr. Shannon Pinson provided advice on methods for selecting rice for improved milling quality to Dr. Ken Foster, managing owner of Kennan Corporation, a private crop breeding company headquartered in Davis, CA. Dr. Foster will use this information to select rice cross-parents that allow for efficient breeding strategies to be used for the development of a rice variety with novel cooking attributes combined with increased resistance to grain fissuring and plant lodging.

On February 25-26th, Drs. Jeremy Edwards and Yulin Jia attended the 5th Annual Meeting of the Arkansas Bioinformatics Consortium, Bioinformatics in food and agriculture meeting (AR-BIC 2019) organized by Arkansas Research Alliance in University of Arkansas Medical School in Little Rock. Dr. Jia was one of the judges for poster competitions among undergraduate, graduate and postdoctoral research associates. Dr. Edwards presented an invited talk titled “Ricebase: A Web Resource for Rice Breeding and Genetic Discovery.”

✓ **Rice Germplasm Distributed**

During February, 1,101 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States and Austria.

• **Stakeholder Interactions**

A craft beer company in South Carolina contacted Dr. Anna McClung on February 4th about a recommendation for a rice variety that could be used in the malting process.

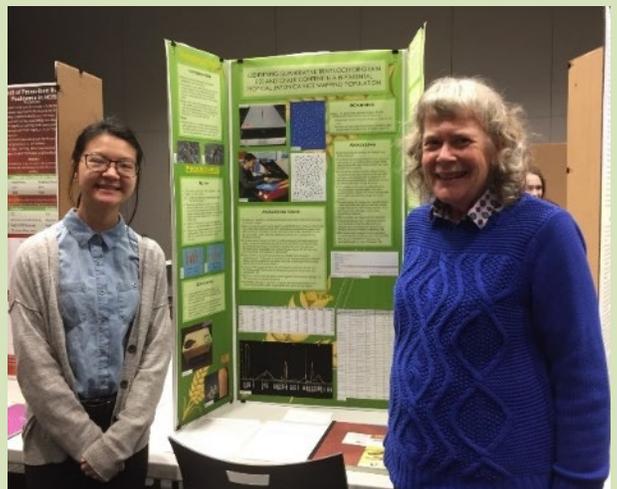
On February 7th, Dr. Anna McClung provided information to an organic seed company regarding specialty rice varieties that may be of interest commercially.

On February 14th, Dr. Anna McClung visited with two representatives of an Arkansas company interested in foundation seed production of specialty rice varieties.

• **Education and Outreach**

On February 8th, Dr. Anna McClung served on the graduate committee for Seth Abugho who is a Ph.D. candidate in the Department of Soil and Crop Science at Texas A&M University in College Station, Texas. He is working with Dr. Muthukumar Bagavathiannan, his major advisor, and conducting research on weed suppression in organic rice production systems.

Ms. Emily Sookaserm, high school senior at the Arkansas School of Mathematics, Sciences and the Arts (ASMSA), presented her Capstone project entitled “Identifying Quantitative Trait Loci for Grain Size and Chalk Content in a Biparental *Tropical Japonica* Rice Mapping Population” at the ASMSA West Central Regional Junior Academy of Science and at the ASMSA West Central Regional Science Fair. She received 2nd place in the Plant Science division at both venues and the Arkansas Soybean Science Challenge Student Research Award for the best project supporting Arkansas soybean production and agricultural sustainability, which included a cash award. During the summer of 2018, Emily was mentored by Drs. Ming-Hsuan Chen and Georgia Eizenga at DBNRRC to conduct the research for her project.



On February 25th, Mary Jia, a senior at Arkansas School for Mathematics, Sciences, and the Arts received overall first place at the West Central Regional Science Fair and she now advances to attend the State Science fair on March 29-30, and the International Science and Engineering Fair on May 12-17 2019, Phoenix, AZ. Her project is titled “A comprehensive analysis of agronomic and disease resistance gene mutations in Katy rice mutants through next generation DNA sequencing”. She was mentored by Dr. Jason Abernathy and Dr. Miles Lange of USDA ARS Harry K. Dupree Stuttgart National Aquaculture Research Center and Dr. Yulin Jia of Dale Bumpers National Rice Research Center. The project was funded by the Murphy summer scholarship awarded to Mary.



Ms. Summer Buckley worked from June 2016 to August 2018 as a Biological Science Research Aide/Intern at USDA ARS Dale Bumpers National Rice Research Center under Dr. Yulin Jia's supervision while she attended University of Arkansas at Pine Bluff. During this period, she gained experience growing rice plants in the greenhouse, measuring plant growth traits in rice paddies, and performing DNA amplification and analysis. Summer has now been accepted into the Master of Science, Nursing program at UCLA. Summer Buckley first met Dr. Jia when she was one of several students who visited DB NRRC as part of an outreach project funded by the National Science Foundation and awarded to Dr. Venkatesan Sundaresan at the University of California at Davis, who partnered with Dr. Bihu Huang, of the University of Arkansas at Pine Bluff (UAPB).