



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

JUNE 2021



MONTHLY RESEARCH HIGHLIGHTS

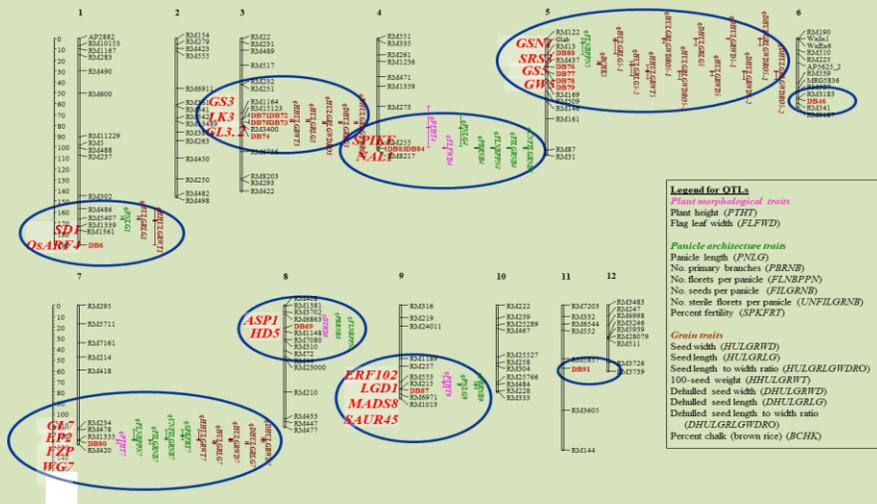
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● **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: New methods to effectively introgress useful alleles (genes) and novel genetic diversity

Eizenga, G C, A.K. Jackson, and J.D. Edwards (2021) Prototype for developing SNP markers from GWAS and biparental QTL for rice panicle and grain traits. Agricultural & Environmental Letters 2021;6:e20047. <https://doi.org/10.1002/ael2.20047>

With the development of advanced genotyping methods, together with advances in computing power, it is now possible to identify the actual genes controlling many important agronomic traits that are related to improving rice yield and quality. From this information, DNA markers can be developed that are linked to these genes and used to assist rice breeding programs. The objective of this study was to develop DNA markers to assist rice breeders in incorporating genes controlling grain shape; grain appearance and cooking quality (chalkiness); panicle (seed head) traits which affect yield; and days to maturity, into variety development programs. This study developed 18 new DNA markers of which 14 markers were shown to be useful in selecting for the previously mentioned genes. The usefulness of these markers was demonstrated by selecting two tropical japonica germplasm lines from the Estrela x NSF199 population. These DNA markers are now available to rice researchers for breeding and further research. The goal is to accelerate breeding selections for desired panicle architecture traits, plant maturity, translucent grains, and the required seed dimensions as mandated by rice market classes, i.e. short grain, medium grain or long grain.



Positions of the 18 SNP markers, identified as “DB” (red) across the 12 rice chromosomes are shown in the linkage (QTL) map for the Estrela x NSFTV199 population. These markers near known genes (large red font) for rice panicle and grain traits, and maturity (*HD5*).

- **Technology Transfer**

- ✓ **Interactions with the Research Community**

On June 1, Dr. Yulin Jia and Ms. Laduska Sells provided information to two scientists in Ohio on the fertilizer management in paddy rice fields.

On June 1, Dr. Anna McClung provided a recommendation of rice varieties and germplasm to test for cold and salt tolerance and possible commercial production in Washington state.

On June 1, Dr. Jinyoung Barnaby, helped prepare a report for the USDA-ARS, National Program Staff on Research Strategies for Achieving Greenhouse Gas-Neutral Agricultural Systems. She was one of several members on a team developing a research plan to address "How can we reduce methane emissions (CH₄) from working lands and livestock to achieve GHG neutral agriculture by 2050?".

On June 21, Dr. Yulin Jia provided information to a researcher in Mississippi State University on the protocols and permits required for conducting research on rice diseases in the USA.

On June 23, Dr. Anna McClung provided information on rice bran for a researcher at the Cincinnati Children’s Hospital and Medical Center conducting studies on the impact of rice bran consumption on inducing innate immunity in mouse trials.

On June 24, Dr. Anna McClung provided information on varieties and methods to a researcher in New Jersey conducting studies on developing rice sprouts as a new healthy food.

On June 24, Dr. Yulin Jia provided information to a researcher in Brazil on the use of germplasm from International Rice Research Institute, the Philippines for introducing blast resistance genes into elite breeding lines.

- ✓ **Rice Germplasm Distributed**

During the month of June, 21 rice genetic stocks were shipped to researchers in the United States and Canada from the Genetic Stocks Oryza (GSOR) collection

- **Stakeholder Interactions**

On June 21, Ms. Lorie Bernhardt, Computer Assistant for the Genetic Stocks *Oryza* (GSOR) collection, provided information on addressing fungal growth during rice seed germination to a university researcher. The information referenced the GSOR web page “Be Successful Germinating Rice Seeds.”

- **Education and Outreach**

Ms. Sarah Ledbetter joined Molecular Plant Pathology lab on June 7th under Dr. Yulin Jia. Sarah graduated from Stuttgart High school and plans to attend Arkansas State University in the fall. She is involved in studying genetic and molecular interactions of rice with harmful microbes. Her responsibilities include but are not limited to collecting agronomic and disease data on selected rice breeding lines under greenhouse and field conditions, performing fungal and plant culture in the lab and greenhouse.



After working 40 years with the USDA-ARS Dr. David Gealy retired May 31st. He served as a Research Plant Physiologist at Pullman, WA for 12 years and then the remainder of his career at the Dale Bumpers National Rice Research Center. He has authored/co-authored 187 publications including over 93 peer-reviewed journal articles on the biology and control of weeds in rice and wheat, outcrossing dynamics between rice and weedy rice, weed-suppressive rice that can be grown with reduced herbicide inputs, and rice-weed interactions in reduced-irrigation systems. His friendship and leadership will be missed.

The USDA-ARS National Plant Germplasm System annually honors three support staff with a Special Achievement award recognizing outstanding contributions to germplasm activity. This year Lorie Bernhardt from DBNRRC was recognized for her sustained contributions. Lorie has been the primary point of contact for the Genetics Stocks *Oryza* collection at DBNRRC since its establishment 2003. The collection currently includes over 38,000 rice accessions and is highly utilized by the research community as evidenced by some 700 accessions shipped out each month, 30% of these going overseas. She has shipped more than 200,000 GSOR accessions to researchers across six continents. Her dedicated effort to managing the GSOR has facilitated research around the world.

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/>