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

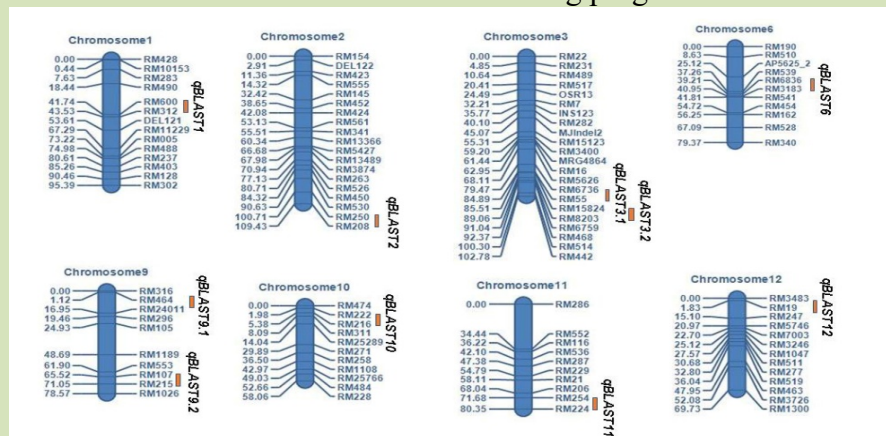**NOVEMBER 2021**

MONTHLY RESEARCH HIGHLIGHTS

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- **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Crop plants with resistance or tolerance to diseases and pests.
Jia, Y., **Jia, M.H**., Yan, Z. 2021. Mapping blast resistance genes in rice varieties 'Minghui 63' and 'M-202'. Plant Disease. Published online Nov. 13, 2021
https://doi.org/10.1094/PDIS-09-21-2095-RE.

Rice blast disease is one of the most lethal diseases for sustainable rice production worldwide, and major disease resistance genes are often broken down shortly after deployment. Minor blast resistance genes are more durable than major blast resistance genes. We evaluated disease reactions of two rice breeding parents 'Minghui 63' and 'M-202' with eleven common US blast races: IA45, IB1, IB45, IB49, IB54, IC1, IC17, ID1, IE1, IG1, and IH1 to find minor blast resistance genes. A recombinant inbred line (RIL) population derived from a cross of these parents was evaluated with the same blast races and analyzed with 156 simple sequence repeat (SSR) and insertion and deletion (Indel) genetic markers distributed on all 12 rice chromosomes. Eight resistance QTLs from 'Minghui 63' and two resistance QTLs from 'M-202' were mapped, and 16 blast resistant lines were identified as genetic stocks. One resistance QTL, *qBLAST2*, on rice chromosome 2, was identified providing resistance to seven blast races. The remaining resistance QTLs were mapped on rice chromosomes 1, 3, 6, 9, 10, 11, and 12. These findings supply useful genetic markers and resources for marker assisted selection in rice breeding programs.

A map showing chromosomal locations of genetic markers for newly identified blast resistance

- **Technology Transfer**

✓ **Interactions with the Research Community**

On November 2, 2021, Dr. Shannon Pinson provided information to Dr. Blanco and Ms. Ester at the University of Bayreuth, Germany regarding selecting and obtaining seed of rice varieties for their planned studies to determine relationships between concentrations of methylated-arsenic in seed and vegetative tissues with resistance to straight head disorder.

November 7-10 the Crop Science Society of America held their annual meeting in Salt Lake City. "Unraveling the Relationship between Phenotype Based Classification of the *Oryza rufipogon* Species Complex and Genotypic Subpopulations" was prepared by Dr. Georgia Eizenga, DBNRRC, for presentation in the Exploration, Conservation, and Characterization of Plant Genetic Resources Using Phenomics and Genomics symposium. This was collaborative research with Dr. Jeremy Edwards (DBNRRC), Cornell University, the International Rice Research Institute and Bayesic Research. Also, Dr. Eizenga contributed "Evaluation of Seedling Cold Stress in the Krasnodarskij 3352 x Carolino 164 Recombinant Inbred Line Population" as both 5-minute oral and poster presentations. This was collaborative research with Dr. Michael Schläppi (Marquette University) and Dr. Edwards.

On November 22, Drs. Yulin Jia, Jeremy Edwards, and Jai Rohila attended a meeting hosted by Dr. Alton Johnson and staff members of University of Arkansas Rice Research and Extension Center on how artificial intelligence can help to maintain sustainability of rice production in Arkansas with scientists from University of Arkansas (UA)-Fayetteville. Subsequently, Drs. Jia and Rohila led a walking tour of DBNRRC for 7 visitors from UA-Fayetteville.

- **Education and Outreach**

The research article entitled "Enhancing the Searchability, Breeding Utility and Efficient Management of Germplasm Accessions in the USDA-ARS Rice Collection", published in *Crop Science*, was selected as one of two 2021 Outstanding Papers in the Plant Genetic Resources division (C8) of the Crop Science Society of America (CSSA). The award was announced at the C8 Division business meeting on Nov. 10. The article was selected based on scientific merit, innovation, and discovery of novel or new approaches in the field of plant genetic resources. The publication was authored by DBNRRC scientists, Anna McClung, Jeremy Edwards, Melissa Jia, Trevis Huggins, and Georgia Eizenga, and curator of the rice germplasm collection, Harold Bockelman. The article can be found at: https://doi.org/10.1002/csc2.20256.

Dr. Barnaby has been with USDA-ARS since 2011. She joined the Crop Systems and Global Change laboratory, Beltsville, MD as a post-doc and investigated crop responses to changing climates including abiotic and biotic stresses by leveraging high-throughput omics technologies. In 2016, she joined Dale Bumpers National Rice Research Center, Stuttgart, AR as a Research Plant Physiologist. She mapped key loci and investigated Genetics (G) x Environment (E) x Management (M) impacts on rice yield and quality using high-throughput genotyping and phenotyping technologies. On Nov 7, 2021, she joined U.S. National Arboretum, Floral and Nursery Plant Research Unit, Beltsville, MD as a Research Geneticist, and will continue to bridge from genome to phenome by integrating high-throughput omics technologies with confirmation of biological functions to underlie a holistic understanding of plant stress interactions for improving turf varieties.

After 22 years at Dale Bumpers National Rice Research Center (DBNRRC), Lorie Bernhardt has announced her retirement effective December 20, 2021. Originally hired in April 1999, as an Office Automation Clerk, she realized promotion potential with the planned addition of the Genetics Stocks *Oryza* (GSOR) Collection, as someone would be needed to manage the seeds and the accompanying database. Following a few years of on-the-job training and continued proficiency in job performance, Lorie was promoted to Computer Assistant for the GSOR in May 2003. She has been the primary point of contact for the GSOR at DBNRRC since its establishment in 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. The USDA-ARS National Plant Germplasm System annually honors three support staff with a Special Achievement award recognizing outstanding contributions to germplasm activity. In 2021, Lorie was recognized for her sustained contributions.

Between April 2002 and September 2002, Lorie participated in and successfully completed the requirements of the USDA's Aspiring Leader Program, a six-month training activity

which included out-of-state shadowing details, presentations and writing assignments. As part of her early GSOR training, Lorie contributed to the selection and release of four indica rice genetic stocks. She was named as a contributor in six technical proceedings or poster abstracts; and her technical assistance was acknowledged in numerous scientific publications produced by DBNRRC scientists.

Future plans include spending more time with her husband John, retired entomologist from the University of Arkansas, and son Phillip, football coach and teacher with Little Rock Central High, and grand-pup Belle, a one-year-old black Labrador. Lorie also plans to expand her quilt-making hobby into a dream job of quilting for others.

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/