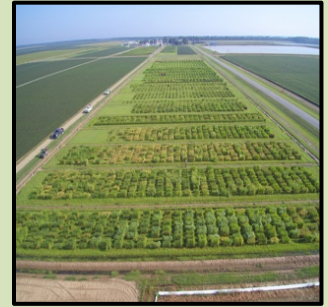




**Dale Bumpers National Rice Research Center
USDA-ARS
Stuttgart, Arkansas**



DECEMBER 2021

MONTHLY RESEARCH HIGHLIGHTS

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- **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Characterized genetic mapping populations, mutant lines, and other germplasm designed for trait discovery, analysis, and increasing genetic diversity in crop plants.

Jia, Y., Singh, V., Gealy, D.R., Liu, Y., Ma, J., Thurber, C.S., Roma-Burgos, N., Olsen, K.M., and Caicedo, A.L. 2021. Registration of two rice mapping populations using weedy rice ecotypes as a novel germplasm resource. *Journal of Plant Registrations*. Published on December 7, 2021. DOI: <https://doi.org/10.1002/plr2.20174>

Weedy rice, competing with cultivated rice, is a major agricultural pest worldwide. Knowledge on the competitiveness of weedy rice can benefit the development of improved rice varieties and improve weedy rice control. We developed two mapping populations from crosses of the Asian indica rice variety ‘Dee Geo Woo Gen,’ (DGWG) with two weedy rice ecotypes, an early-flowering straw hull (SH) type ‘AR-2000-1135-01’ from Arkansas and a late-flowering black hull (BHA) type ‘MS-1996-9’ from Mississippi. The progeny from these weed and mapping populations have been used to identify genomic regions associated with weedy traits, as well as resistance to sheath blight and rice blast diseases. The mapping population consists of 186 (DGWG/SH) and 236 (BHA/DGWG) F₈ progeny, of which 175 (DGWG/SH) and 224 (BHA/DGWG) were used to construct two linkage maps using single nucleotide polymorphic markers (SNPs) to identify weedy traits, sheath blight and blast resistance loci. These mapping populations and related datasets represent a valuable resource for basic rice evolutionary genomic research and applied marker-assisted breeding efforts in disease resistance.



Seeds of weedy red rice and domesticated Asian rice, panicles of mapping parents and enhanced blast resistance, and a commercial field infected with red rice.

- **Technology Transfer**

- ✓ **Interactions with the Research Community**

From November 26, to December 7, Dr. Yulin Jia assisted Dr. Brian Staskawicz, Professor of Department of Plant and Microbial Biology of University of California at Berkeley to seek rice germplasm with blast resistance genes.

As part of the Second Workshop on “The Nature of Reproductive Barriers in Rice” held December 9 in Kunming, P.R. China, Dr. Georgia Eizenga made an invited virtual presentation entitled “Phenotypic Data Augments Interpretation of Population Structure in the *Oryza rufipogon* Species Complex” based on the co-authored research article submitted to the *Frontiers in Plant Science* special issue entitled “Reproductive Barriers and Gene Introgression in Rice Species -Volume II”. The conference was organized by co-editor of the special issue, Dayun Tao (Yunnan Academy of Agricultural Sciences), along with Yaoguang Liu (South China Agricultural University), Yidan Ouyang (Huazhong Agricultural University) and Zhigang Zhao (Nanjing Agricultural University).

- ✓ **Rice Germplasm Distributed**

During the month of December 1977 rice genetic stocks were shipped to researchers in the United States from the Genetic Stocks Oryza (GSOR) collection.

- **Education and Outreach**

Dr. Shannon Pinson has been with USDA-ARS since 1989 when she joined the Rice Research Unit in Beaumont, TX as a Research Plant Geneticist. She moved to the Dale Bumpers National Rice Research Center, Stuttgart, AR in 2012. Dr. Pinson’s interest in improving agriculture through plant genetics began as a farm girl in Indiana, when she and her brothers often attended annual Field Days at Purdue University and National Soybean Conventions where her father, uncle, and grandfather would discuss newly released corn, wheat, or soybean varieties and new agronomic practices with excitement. State Extension Agents regularly planted variety demonstration plots on the Murphy family farm, and Shannon remembers helping her father and Extension Agents collect data for some of the first farm-scale no-till studies conducted in Indiana. These agricultural experiences, coupled with Interaction with Missionaries in Africa and Asia sponsored by her church, inspired in



Shannon a desire alleviate world hunger and rural poverty through Agronomy and plant genetics. Shannon earned her bachelor's degree in Agricultural Science, with a minor in International Agriculture, at Purdue University in IN, and earned her master's in Agronomy and PhD in Plant Genetics at the University of California, Davis, CA. She was introduced to the joys of working with USDA ARS through her MS and PhD mentor, Dr. Neil Rutger, who later served as the first Director of the DBNRRC in Stuttgart, AR. Through her ARS career, Shannon has visited and mentored scientists from Brazil, Guatemala, Egypt, Bangladesh, India, Pakistan, Vietnam, Japan, South Korea, China, Liberia, and Venezuela. She has worked directly with breeders in TX, AR, and LA to discover then select breeding progeny containing molecularly-tagged genes for disease resistance and kernel fissure resistance. Dr. Pinson's current research aims at identifying genes and mechanisms that limit accumulation of arsenic in rice grains, and to improve adaptation to short periods of water deficit such as those experienced under furrow irrigation or alternate wetting and drying, rice production systems that conserve water, reduce methane production, and decrease arsenic uptake.

Eric Grunden grew up on an 87-acre farm in central Ohio and has been involved in agriculture his entire life. He began working at the Dale Bumpers National Rice Research Center in 2007 as a Biological Sciences Technician in molecular biology for Dr. Helen Miller. He now serves as technician for Dr. Shannon Pinson, Research Geneticist. Eric earned his bachelor's degree in Agricultural Science, and master's degree in Mycology/Plant Pathology at the University of Illinois. Prior to joining the USDA, Eric conducted freelance electron microscopy for the Illinois Dept of Natural Resources and was an Academic Professional for the Dept of Crop Sciences at UI. He also worked for Chromatin Inc. as part of the scientific team that first constructed functional synthetic minichromosomes for agricultural crops. While at DBNRRC, Eric has assisted with a wide range of rice studies, including cold tolerance, salt tolerance, straighthead disorder, carotenoids in stackburn, kernel fissuring, arsenic uptake, water management (AWD), root architecture and others. Over his career, Eric has been an author on, or acknowledged in, several scientific publications. While working for Dr. Pinson, he has participated in collaborations, helped devise and construct equipment to facilitate better rice breeding results, submitted photography of rice fissuring that was selected for the cover of the *Journal of Crop Sciences*, and created an improved time-saving method for germination of rice in hydroponic systems. He has also participated in several outreach events, such as judging local science fairs and presenting information on job opportunities in the USDA at a career expo at UAPB.

In his spare time, Eric enjoys spending time with his family, reading, and playing music.



- **New Employee**

On Monday Dec. 20th, Mr. Jeffrey Girton joined DBNRRC as the Maintenance Mechanic and will be the team lead for the maintenance staff. He has been working in this same capacity for 12 years at a large United States Coast Guard facility and has skills in HVAC, facility structures, sanitary systems, refrigerants, fire suppression systems, and is trained as an electrician. As a veteran, he served in the US Army for over 8 years, during his service he was deployed overseas.



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/>