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

FEBRUARY 2023

MONTHLY RESEARCH HIGHLIGHTS

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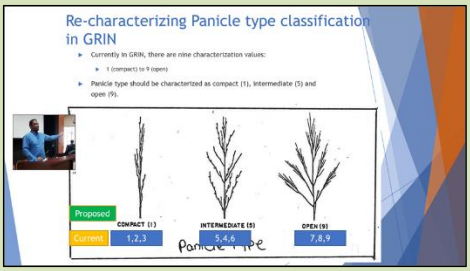
- **Technology Transfer**

  - ✓ **Interactions with the Research Community**

On February 8, 2023, Drs. Jai Rohila and Yulin Jia attended the 29th annual Arkansas State University Agribusiness Conference in Jonesboro, AR, to get firsthand knowledge on the latest in rice production, agricultural policy, the next farm bill, and to interact with rice growers and various organizations workings in the US rice industry. In the morning sessions Dan Basse, President of the AgResource Company, discussed world agricultural markets and outlook. His key message was "heatflation" i.e., high temperatures affecting crop productions worldwide, and it included rice productions. Joe Outlaw, Professor of agricultural economics at Texas A&M University, and Mary Kay Thatcher, Senior lead for federal government relations at Syngenta discussed the economics and politics of agricultural policy and the next farm bill. Afternoon sessions were commodity breakouts. Drs. Jia and Rohila both attended the rice sessions and participated in discussions on rice sustainability led by Josh Hankins (USA Rice) and Austin Brown (Riceland Foods, Inc.). Grayson Daniels from Riceland presented an overview of current rice industry issues from grain quality perspective. After the Agribusiness Conference Drs. Jia and Rohila visited USDA-ARS Delta Water Management Research Unit at Jonesboro and had discussions and facility tour with Drs. Michelle Reba, Arlene Adviento-Borbe, and Joe Massey.

From left to right: Drs. Arlene Adviento-Borbe, Yulin Jia, Michelle Reba, Joe Massey and Jai Rohila.

The 42nd Rice Crop Germplasm Committee (CGC) meeting was held on February 20, 2023, in conjunction with the Rice Technical Working Group (RTWG). The meeting was attended by seven of the nine current committee members (or a representative); six of the seven *ex-officio* members; and ten guests. The meeting was organized by committee chair, Dr. Georgia Eizenga. Minutes of the virtual 41st Rice CGC meeting were approved, Dr. Peter Bretting reviewed the status of the National Plant Germplasm System (NSGC), Dr. Harold Bockelman reported 18 *O. sativa* accessions were added to the rice collection for a current total of 19,130 *Oryza* accessions, and Dr. Bishwo Adhikari (APHIS) reported he was processing 18 *O. sativa* and 36 *O. australiensis* through quarantine. Dr. Trevis Huggins reported on the Genetic Stocks-*Oryza* (GSOR) had distributed 35,670 as part of 288 orders since 2020 and six new populations have been added, with two populations pending in 2023-24. He continues to genotype the NSGC rice accessions as they are rejuvenated due to low inventory. Trevis recommended decreasing the number "Panicle Type" descriptor categories from nine to three and adding the "Leaf Blade Color" descriptor to the GRIN-Global database for rice, which the committee approved after discussion. The "Crop Vulnerability for Rice" slide was updated. Nick Bateman, Brijesh Angira and Gretchen Zaunbrecher were re-elected/elected as committee members for 6-year terms, Stan DeGuzman was approved to compete Xueyan Sha's term, and Georgia was re-elected as committee chair.



Panicle type categories.

Leaf blade color descriptor.

RTWG meets biennially to provide for continuous exchange of information, cooperative planning, and periodic review of all phases of rice research and extension being carried out by the states, federal government, and cooperating organizations. It develops proposals for future work, which are suggested to the participants for implementation. This meeting is one of the best opportunities for ARS rice scientists to transfer technology to our stakeholders and customers.

The 39th RTWG was held from February 20-23, 2023, in Hot Springs, Arkansas and some 340 participants attended. Overall, there were 123 oral presentations and 100 poster presentations. DBNRRC scientists and staff served as judges for the student oral and poster competitions. The 17 oral and poster presentations by DBNRRC scientists and staff demonstrated progress on genetic improvement of rice varieties with enhanced disease resistance, abiotic stress tolerance and nutritional benefits. Specifically, Ms. Heather Box presented a poster on "Blast Panel Investigation of Disease Resistance of High Yielding Breeding Lines", Dr. Yulin Jia presented two talks, on "Improvement and

characterization of medium grain rice germplasm for US breeders and growers", and "Characterization of a Major Sheath Blight Resistant QTL9-2 on Rice Chromosome 93," and a poster on "A User-Friendly Rice Seed Disinfection by Ultraviolet Light Irradiation in a Biosafe Flow Cabinet". Dr. Pinson presented a talk on "Discovery of Genes that Regulate the Concentrations of Anthocyanin and Proanthocyanidin Antioxidants in Purple and Red Rice Varieties" and Mr. Jace Everette presented a poster on "Increasing Resistant Starch in Rice with Three Starch Synthesis Genes". Dr. Jai Rohila and Ms. Tiffany Sookaserm presented a poster and two talks: 1) "USDA-ARS *Aus* (*Oryza sativa* L.) panel: an Untapped Resource to Enrich Natural Genetic Variation for Abiotic Stress Tolerance in US Rice Breeding Programs" (in collaboration with Mr. John Mitchell and Dr. Sathish Ponniah from UAPB), 2) "Genomic Dissection of tropical *japonica* x *indica* Rice Population for Responses to Variation in Growing Temperatures", and 3) Do Daytime and Nighttime Temperatures Affect Rice Yield and Quality? (In collaboration with the Clemson University). Dr. Anna McClung presented a talk on "Development and Exploration of a Global Tropical *japonica* Diversity Panel" and a poster on "Culinary and Health Beneficial Properties of Rice Varieties Developed for Niche Markets". Ms. Melissa Jia presented a poster on "Blast Resistance Genes in Rice Varieties 'Pecos' and 'M205'. Dr. Jeremy Edwards presented a talk on "QTL Mapping and Genomic Prediction of Disease Reactions of Rice to the Rice Blast Fungus *M. oryzae* Races." Dr. Georgia Eizenga presented a talk titled "Insights from the Phenotypic and Genotypic Characterization of *Oryza rufipogon* Species Complex (*ORSC*) Accessions" and posters titled "Phenotypic Characterization of a Suite of Wild-Introgression Lines in Elite *Indica* and *Japonica* Rice Backgrounds" and "Exploring the Genetic Variation Among *Oryza sativa* Accessions in the Africa Rice Collection". Dr. Trevis Huggins presented a talk titled "Genotyping Accessions in the National Small Grains Rice collection to Enable Curation and Identification of Accessions with Traits Useful for U.S. Rice Breeders".

On February 23, 2023, Dr. Bishwo Adhikari, Team Leader and Program Manager of the Poaceae Quarantine Program at USDA-APHIS visited DB NRRC, and Dr. Jeremy Edwards and Mr. Aaron Jackson led Dr. Adhikari on a tour of the facilities. Dr. Adhikari's group at APHIS has a critical role in DB NRRC efforts to import new rice varieties into the US from international sources for research and base broadening of US rice germplasm.

Dr. Ming-Hsuan Chen received the Rice Industry Distinguished Service Award, awarded at the 39th Rice Technical Working Group (RTWG) meeting in Hot Springs, AR. Prior to her retirement in 2002, Dr. Chen worked for the USDA-ARS for 21 years as a Research Chemist, starting with the Rice Research Unit in Beaumont, TX in 2001, and moving in 2012 to the Dale Bumpers National Rice Research Center in Stuttgart, AR. Her research was devoted to two aspects of rice grain quality research: rice grain functional quality, and various health beneficial attributes of whole grain (brown) rice. Dr. Chen was known internationally for identifying genetic variants in starch synthesis genes that are associated with critical eating and processing quality, and for developing genetic markers linked to these traits that have since been used for marker-assisted selection by breeders in the US and around the world. Dr. Chen also endeavored to improve the health beneficial quality of whole grain rice as a means to combat the rising incidence of chronic diet-affected diseases. She explored diverse global rice varieties and identified those that have superior health beneficial properties such as vitamins, fatty acids, dietary fiber, and antioxidant compounds. These germplasm can now be used as parents for creating new rice varieties with health benefits. Dr. Ming Chen's award was accepted in absentia by her husband, Dr. Lee Tarpley and one of her technicians since 2013, Mr. Jace Everette.

From left to right: Mr. Everette and Dr. Tarpley.

Dr. Ming Chen

On February 24, 2023, Dr. Oliver Manangkil, Head Breeder at the Philippine Rice Research Institute (PhilRice), Dr. Sailila Abdula, Executive Director of the seven PhilRice Branch Research Sites, and Dr. Arlene Adviento-Borbe, scientist at the USDA ARS Delta Water Management Research Unit, Jonesboro, AR, visited the USDA Dale Bumpers National Rice Research Center (DBNRRC) and met with several ARS scientists and staff members to share insights on methods for rice breeding and genetics, with an emphasis on the use of molecular genetics to direct breeding selections and for fingerprinting of varieties. Drs. Yulin Jia and Shannon Pinson provided an overview of rice research at the DBNRRC, and a tour of the facilities.

✓ **Rice Germplasm Distributed**

During the month of February, 118 rice genetic stocks were shipped to researchers in Austria, Belgium, and the United States.

The Breeding and Genetics program under Dr. Anna McClung provided seed of specialty rice varieties to growers in Pennsylvania (11 varieties), Arkansas (5), and Louisiana (5). In addition, Dr. McClung worked with the New York Botanical Gardens to identify and provide seed of 27 rice varieties that will be used this summer in an outreach program focused on food crops from the Caribbean and historically connected to the diaspora of West Africans because of enslavement.

- **Stakeholder Interactions**

On February 28, 2023, Dr. Anna McClung participated in the Carolina Gold Rice Foundation board meeting via zoom where there was a discussion on the pros/cons of branding US grown specialty rice varieties with information about the variety name and the location where it was grown, much like has been done with the marketing of Vidalia onions.

- **Education and Outreach**

On February 17, 2023, Mr. Luis Coral, Dr. Georgia Eizenga, Ms. Quynh Grunden, Dr. Nisha Patwa and Ms. Tiffany Sookaserm, from the DBNRRC participated in "Science Day" at the local Stuttgart Public Library. Over 80 students from 4th through 6th grade and their teachers participated in this event. Through four displays, they were introduced to the parts of the rice plant, methods for growing rice that conserve water, the diversity of rice seeds grown around the world, and tasting four types of rice, which were visibly different, tasted different and represented sticky rice for sushi, aromatic rice, and "healthy" rice with antioxidants because the rice has purple or red bran. "Behind the scenes", Mr. Eric Grunden, Ms.Jackie Hughes, Drs. Anna McClung and Jai Rohila, and Ms. Laduska Sells assisted in various aspects of the preparation of materials for the four displays and/or the take home "Rice Goody Bags" which included a kit for growing rice plants. The students were from the local Holy Rosary Catholic School and St. John's Lutheran School.

Showing the parts of a rice plant.

Explaining how to conserve water.

Rice around the world.

Rice taste different!

From left to right: Mr. Coral, Ms. Grunden, Dr. Eizenga, Ms. Sookaserm and Dr. Patwa.

On February 17th, 2023, the Dale Bumpers National Rice Research Center hosted three visiting scientists led by Dr. Yoshiya Shintoto from Division of Crop Rotation Research for Lowland Farming Tohoku Agricultural Research Center (TARC), NARO, Japan. Dr. Shintoto and Dr. Kammuri Hideaki and Dr. Shunsuke Miyaji presented seminars on crop rotation in paddy field. The seminars were delivered in hybrid format – live in-person attendance joined by online audience from the ARS Jonesboro, and University of Arkansas. The visit also included a tour of the ARS facility, visit of Drs. Alton Johnson and Chris Henry of Rice Research & Extension Center, Univ of Arkansas along with a visit to a commercial rice farm of Mr. Dave Sites in Stuttgart where crop rotation has been practiced for the last several years.

Picture taken at Mr. Sites farm in Stuttgart, AR.

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/