



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



OCTOBER 2017

MONTHLY RESEARCH HIGHLIGHTS

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1. Recent Scientific Publications –

USDA-ARS Research Goal: Crop plants with enhanced yield and increased resistance to disease.

Eizenga, G.C., Sanchez, P.L., Jackson, A.K., Edwards, J.D., Hurwitz, B.L., Wing, R.A., Kudrna, D. 2017. **Genetic variation for domestication-related traits revealed in a cultivated rice, Nipponbare (*Oryza sativa* ssp. *japonica*) × ancestral rice, *O. nivara*, mapping population.** *Molecular Breeding* (2017) 37:135. doi: 10.1007/s11032-017-0734-5

Cultivated rice, which is grown worldwide, was domesticated thousands of years ago from the wild progenitor species, *Oryza nivara*, an annual plant. During the course of rice domestication, man selected for desirable traits including erect, shorter plants, non-shattering seed, increased panicle size, larger seed, increased yield, brown bran color, and specific cooking and sensory qualities. Still today, rice breeders select for these traits to improve rice yield and quality after incorporating other desirable traits like resistance to diseases and insects, as well as, tolerance to stresses like soil nutritional imbalances and reduced water use. With the molecular tools currently available, it is possible to reconstruct the changes that occurred in plant genes during the domestication process. To better understand these changes and to assess the potential value of genes from a wild progenitor species that may have been lost during domestication, we compared the DNA of the cultivated rice variety Nipponbare, with that of the wild ancestor, *O. nivara*. We evaluated progeny from a cross between Nipponbare and *O. nivara* for 19 traits related to plant stature, plant height, shattering, panicle size, seed size, and bran color along with DNA markers spread throughout the genome. We identified 37 potential genes linked to yield and/or domestication traits that had been previously reported and an additional nine genes that were newly discovered. These may be novel gene(s) contributed by the *O. nivara* parent which may have been lost in domestication and can potentially be used for improvement of US rice cultivars through breeding. Photo of: Nipponbare (*O. sativa*) and the ancestral parent, *O. nivara*



2. Technology Transfer

a. Formal Events:

To Research Community

On October 22-26, 2017, Drs. Shannon Pinson and Georgia Eizenga of the Dale Bumpers National Rice Research Center, Stuttgart, AR, attended the Crop Science Society of America Conference in Tampa, Florida. Dr. Pinson made a presentation entitled “Genetic, Chemical, and Field Management Strategies for Reducing Accumulation of Arsenic in Rice Grains” in the symposium on Soil and Fertilizer Management for Food Crops to Improve Human Mineral Nutrition and Dr. Eizenga made a presentation entitled “Validation of Yield Component Traits Identified By GWA Mapping in a Rice *Tropical japonica* x *Tropical japonica* RIL Mapping Population” in the Genomics, Molecular Genetics and Biotechnology session.

On October 31, 2017, Dr. Yulin Jia was selected to be the US organizer for the Rice Functional Genomics Workshop to be held at the annual Plant and Animal Genome meeting in San Diego, California. Dr. Jia will co-chair 2018 workshop with two other international organizers, one from Japan and another from China, and will serve in this position for three years.

b. Informal Contacts

Dr. Jinsong Bao, from the College of Agriculture and Biotechnology at Zhejiang University, Hangzhou, China visited the DBNRRRC on October 13th. He presented a seminar on “Genetic bases of rice eating and nutritional quality” and visited with the staff regarding grain quality research.



On October 13, 2017 fifteen employees from DBNRRC and several visiting scientists visited Riceland Foods, Inc. milling and packaging facility in Stuttgart, AR. Mr. Carl Brothers, the COO of Riceland Foods, Inc., provided an overview of the history and expansion of the company. This was followed by an extensive tour of the facility where milling, grain sorting, grain grading, packaging and shipping operations were observed.



c. Germplasm Exchanged:

During October, 920 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the US.

3. Education and Outreach



October 10-13, 2017 Dr. Jinyoung Barnaby hosted a visit by Ms. Mirae Oh, a visiting scientist at USDA-ARS, Environmental Microbial and Food Safety Lab in Beltsville, MD. During her visit in Stuttgart, she learned and performed carbon and nitrogen content analysis in rice plant tissues to understand genetic variation in the source-sink relationship.