September and October 2015
Highlights from the Dale Bumpers National Rice Research Center
Stuttgart, AR

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1. Recently Accepted Publications

ARS Anticipated Product: Higher yielding plants.

S.R.M. Pinson and Y. Jia. 2015. QTLs for early tiller production and relationships with rapid seedling growth and increased panicle number in rice (Oryza sativa L.). Crop Science doi: 10.2135/cropsci2014.09.0667; posted online October 12, 2015, https://dl.sciencesocieties.org/publications/cs/first-look/pdf/Cropsci2014.09.0667.pdf

Studies have shown that yields of the japonica rice varieties grown in the USA today could be improved with increased tillering as is seen in indica varieties. In this study, genetic loci (QTLs) affecting tiller number at various plant growth stages were identified using a japonica x indica mapping population. Of the five QTLs found to affect tiller number, three had a positive effect on panicle number (productive tillers) and were also associated with rapid early seedling plant growth. Breeders can use genetic markers reported here to develop new rice varieties with increased tiller number, panicle number, and grain yield.

ARS Anticipated Product: Better disease control in crops

J. Li., L. Lu., Y. Jia, Q. Wang, Y. Fukuta, and C. Li. 2015. Characterization of field isolates of Magnaporthe oryzae with mating type, DNA fingerprinting, and pathogenicity assays. Plant Disease (Published on line on October 19. http://dx.doi.org/10.1094/PDIS-06-15-0660-RE)

The rice blast fungus, Magnaporthe oryzae, causes pervasive disease on rice, and is one of the main contributors of rice yield losses. The sexuality of the rice blast pathogen is controlled by the MAT gene and has two mating types, MAT1-1 and MAT1-2. Sexual reproduction may occur when two opposite mating types meet, and this can lead to an increase in genetic diversity of the fungus making it more difficult to control the disease. In this study, rice blast was collected from two large rice growing regions in Yunnan Province of China to examine the genetic diversity, mating type, and pathogenicity. We demonstrated that there was no evidence of sexual recombination between MAT1-1 and MAT1-2 populations and that they caused a similar amount of disease on a range of rice varieties that carried different blast resistance genes. However, we found that MAT1-2 was more genetically diverse suggesting it has the capability to adapt over a broader range of environments in Yunnan province. This study demonstrated that the rice blast pathogen is highly diverse enabling it to cause disease on all known resistance genes in rice even without sexual recombination.

2. **New Significant Research Collaborations**

International

USA

3. **New Awarded Grants**

USDA AFRI; Mechanisms of cold stress tolerance responses in rice; Georgia Eizenga (ARS) with Michael Schläppi (Marquette Univ.); $500,000, 4 years)

A one year sub-award of $55k from University of Massachusetts (UMASS) was received as part of an extension of the National Science Foundation funded project "CPGS: Genomic structure and contemporary evolution of weediness in red rice". The funds will be used for field and greenhouse evaluation of sheath blight resistance in rice. Drs. Yulin Jia and Dave Gealy are the ARS scientists involved in the project.

4. **Technology Transfer**

a. **Formal Events:**

To Non-research stakeholders

To Research Community

Research on rice blast disease by Dr. Yulin Jia was featured on USDA blog at http://blogs.usda.gov/2015/09/15/preserving-heirloom-collections-microbial-that-is/

In an effort to extend research findings to a broader community, the ASA-CSSA-SSA societies helped to develop a web-story on research being conducted at DBNRRC on the development of rice varieties with purple bran having potential health beneficial properties. Some of the outlets picking up the story included:

http://www.healthnewsdigest.com/news/Food_and_Nutrition_690/Purple-Bran-Rice-Defies-Convention.shtml
https://www.hertz.ag/ag-industry/current-headlines/0702bf5309252015070700/ (need to scroll down to see)
http://www.morningagclips.com/purple-bran-rice-defies-convention/
http://www.agprofessional.com/news/purple-bran-rice-defies-convention

Researchers from Texas A&M University, Louisiana State University, Mississippi State University, met with ARS researchers from Stoneville, MS and Stuttgart, AR at the DBNRRC during Oct. 20-21, to discuss collaborative opportunities for extending the use of genomic technologies to enhance US rice breeding efforts.

b. Informal Contacts:

From September 26 to 28, ARS DB NRRC hosted three visiting scientists from Yunnan Academies of Agricultural Sciences (YAAS), Kunming, China. One of the scientists from YAAS presented a seminar titled 'Constructing introgression lines of wild rice species into *Oryza sativa* cultivars by different approaches'. This visit was part of the continued interactions and collaborations of ARS scientists with scientists from YAAS.

ARS researcher Georgia Eizenga from DB NRRC, Stuttgart, AR was part of an international team invited to review the perennial rice research program in Yunnan Province, China, Oct. 11-16, 2015. At the Yunnan Academy of Agricultural Sciences (YAAS), she made a presentation entitled "Capturing Useful Traits in Rice and its Wild Relatives" and gave an overview of the research currently being conducted at the DB NRRC to a group of about 25 faculty, staff and students from YAAS, Yunnan Agricultural University, and team members from The Land Institute (Salinas, Kansas), Charles Sturt University (Australia), and FAO (Food and Agriculture Organization of the United Nations). Potential future interactions between YAAS and the DBNRRC were discussed.

c. New MTAs

d. Germplasm Exchanged:

During September, 2,908 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the US. During October, 1,758 rice accessions were distributed to researchers in the US, Belgium, Brazil, India, South Korea, and the United Kingdom.

Some of the recipients of GSOR seed stocks have acknowledged the source of these materials in publications that have resulted from their research use. An example of these journal articles is Molecular Plant Pathology (2015) 16(8), 870-881.

5. Educational Outreach

6. Awards/Honors