December 2015
Highlights from the Dale Bumpers National Rice Research Center
Stuttgart, AR

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1. Recently Accepted Publications

ARS Anticipated Product: Enhanced germplasm derived from introgressing genes from progenitor species into adapted genepools

G.C. Eizenga, P.C.F. Neves, R.J. Bryant, H.A. Agrama and D.J. Mackill. 2015. Evaluation of a M-202 x *Oryza nivara* advanced backcross mapping population for seedling vigor, yield components and quality
Euphytica (http://DOI 10.1007/s10681-015-1613-y; posted 12/17/2015)

Improved seedling vigor and cold tolerance at germination allows rice to be planted earlier in the growing season, improves stand establishment when rice is broadcast seeded into cold water, and improved competition with weeds after planting. Other reports have shown *O. nivara* (*O. rufipogon*), the undomesticated, wild species progenitor of cultivated rice, has the potential to improve the yield of cultivated rice, *O. sativa*. Using DNA markers, the chromosomal location of potential genes underlying the traits evaluated were identified. Potential genes attributed to the *O. nivara* parent that increased coleoptile and shoot length to improve seedling vigor, and increased number of panicles per plant, kernel length and grain weight for potentially improving grain yield. Nine lines were identified with improved seedling vigor and these can be used for improving vigor in rice cultivars currently under development. Knowing the genes that affect yield components like the number of panicles per plant, percent seed set, grain weight and kernel size will impact selection for improved rice yields.

ARS Anticipated Product: Plants with resistance to diseases

Yan Liu, Yulin Jia, Dave Gealy, David Goad, Ana Caicedo and Kenneth Olsen. 2015. Marker development for rice blast resistance gene *Pi66(t)* and application in the USDA rice mini-core collection. doi: 10.2135/cropsci2015.07.0422; Date posted: December 01, 2015.

Molecular markers are useful for the identification of critical genes that control important traits in agricultural crops, and for the utilization of these genes in crop improvement using marker assisted selection (MAS). The improvement of blast disease resistance of rice varieties is a major goal for rice breeders. In earlier work, we mapped the blast resistance (*R*) gene *Pi66(t)* to a small region on chromosome 11, and six potential R genes were identified. In the present study, we developed three molecular markers, WRKY41, NBS-LRR-970-1, and NBS-LRR-970-2, for the *Pi66(t) R* gene. The validation of two newly developed markers, WRKY41 and NBS-LRR-970-1, suggested they were consistently inherited along with the *Pi66(t) R* gene in two large recombinant line (RIL) populations that were developed by crossing two U.S. weedy rice strains (PI653435, straw hull awnless weedy rice and, PI653419, black hull awned weedy rice) with an indica rice variety Dee Geo Woo Gen. Two of the markers were tested in a diverse USDA-ARS core collection of 217 rice lines and indicated that marker NBS-LRR-970-1 was directly linked to the *Pi66(t) R* gene. Results from this study suggested that the newly developed marker not only can be used to identify resistant lines with *Pi66(t)* in the RILs, but can also be used in rice germplasm with a broad genetic background. Taken together, these

markers and rice germplasm lines that carry *Pi66(t)* are essential tools and materials for rice breeders using an MAS approach to crop improvement.

2. New Significant Research Collaborations

International

USA

3. New Awarded Grants

4. Technology Transfer

a. Formal Events:

To Non-research stakeholders

To Research Community

b. Informal Contacts:

Dec.15, rice producers Mike and, his son, Lawrence Wagner visited with Drs. McClung and Chen at DBNRRC to discuss specialty rice varieties for production in Mississippi and their health-beneficial potential.

c. New MTAs

d. Germplasm Exchanged:

During December, 410 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the US, Australia and France.

5. Educational Outreach

6. Awards/Honors