**Jia\_Yulin\_Abstract**

**Rice germplasm characterization and enhancement for the sustainability and resilience of the US rice industry using functional genomics tools**

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One goal of the Dale Bumpers National Rice Research Center (DBNRRC) is to address the needs of the US rice industry. To achieve this, over the past 25 years DBNRRC scientists have made significant contributions toward improved disease resistance and grain quality. The Genetic Stocks *Oryza* (GSOR) collection was established in 2003 and has grown to about 33,000 accessions, including over 20K Katy putative mutants, mapping populations, diversity panels and new germplasm lines. Development of molecular markers associated with genes has facilitated rapid integration of these genes into breeding programs, accelerating improved cultivar development. The US rice germplasm collection of about 19,000 globally diverse cultivars, is being continually evaluated to search for new genes and new valuable traits, such as disease resistance, grain quality and nutrition, and stress tolerance. By unraveling the molecular pathways and genetic factors controlling desired traits, innovative strategies for breeding disease-resistant rice cultivars with improved yield potential were developed. For example, a marker for blast resistance gene, *Pi-ta* is being used routinely by US rice breeders. Cloning the *Ptr* gene in rice, an atypical broad spectrum blast resistance gene, enabled a better understanding of the molecular basis of plant innate immunity. Thus far, the *Pi-ta* and *Ptr* genes have been deployed effectively in over 20 US rice cultivars, leading to hundreds of millions of dollars saved on pesticide applications. Progress on broadening the genetic basis for achieving highly productive and sustainable ‘Green Super Rice’ cultivar development for the US rice industry will be presented.

Keywords: association, germplasm, genetic stocks, GSOR, genomics, mutants, the Ptr gene.