Jia\_Yulin\_Abstract

**Challenges and Opportunities of Rice Disease Managements in the USA**

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Most US rice is grown under a continuous flood in the Southern USA where sufficient rainfall and relative high humidity occur during the rice growing season. The most common diseases affecting rice in the Southern USA are rice blast, sheath blight, brown spot, seedling blight, *Cercospora*, false smut and kernel smut, all of which are caused by fungal pathogens. Under hot dry weather conditions, bacterial panicle blight, caused by the bacterium *Burkholderia glumae*, has been occasionally observed and negatively impacts crop yield. Most recently, a newly emerging leaf blight disease caused by the bacterium *Pantoea ananatis* has been observed on experimental stations in Arkansas and Louisiana. An integrated research and extension team consisting of researchers from the federal government and different universities has been assembled to develop solutions to manage these rice diseases in the USA. A wide range of techniques are used in this research including genome sequencing, yeast two- and three-hybrid interactions, *in vivo* interactions, transgene over expression and genome editing using CRISPR/Cas. Diseases are being evaluated with plants grown from tissue culture as well as seed in growth chamber, greenhouse and field conditions at experimental stations and on farms. The research team thus far has used germplasm profiles developed with DNA markers and traits and their associations, to establish a better understanding of the molecular basis of disease susceptibility and resistance, the molecular basis of resistance gene-mediated signal transduction pathways, and the mechanisms of pathogen surveillance and host-pathogen interactions. Progress toward a sustainable and environmentally benign disease management will be presented.

Keywords: Biotic stress, functional genomics, disease resistance and susceptibility