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

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MONTHLY RESEARCH HIGHLIGHTS

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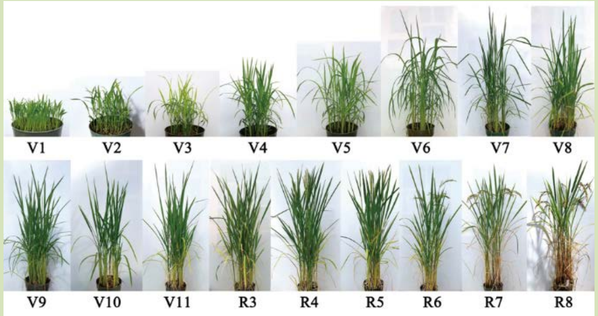
- **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Enhanced knowledge of existing diversity in crop plant interactions with biotic factors

Chen, X., Jia, Y., and Wu, B. M., 2017. Evaluation of rice responses to blast fungus Magnaporthe oryzae at different growth stages. Plant Disease doi/10.1094/PDIS-12-17-1873-RE. Posted July 13 2018.

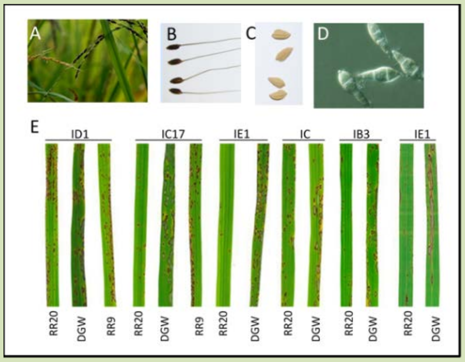


Blast disease of rice caused by the fungus Magnaporthe oryzae is one of the most serious threats to stable rice production in the USA and worldwide. We evaluated responses of two japonica rice varieties, M - 202 and Nipponbare, to one commonly found US race/isolate of M. oryzae at different vegetative growth stages, V1 to V10, under greenhouse conditions. Despite minor differences in the two rice varieties, both were susceptible from V1 to V4 but susceptibility was reduced after V5, and the varieties were completely resistant at V10. Similar results were obtained with M-202 when plants were inoculated at each growth stage individually from V1 to R8 (final grain maturity). The only difference from the first test was that the plants were resistant at V9 instead of V10. This suggests that rice plants have enhanced resistance in later growth stages. These findings are useful for identifying effective genes for managing rice blast disease in commercial rice production worldwide.

This addresses USDA-ARS Research Goal: High quality genetic resources and associated information delivered to customers

Jia, Y., and Gealy, D. 2018. Weedy red rice has novel resistance resources to biotic stress. Crop Journal. Posted on July 27, https://doi.org/10.1016/j.cj.2018.07.001

Weedy red rice (WRR) is an aggressive weed found in cultivated rice that can also naturally interbreed with the crop because they are the same species, *Oryza sativa*. Consequentially, WRR populations have maintained high genetic diversity and can be a source of novel genes for biotic stress tolerance. In this study, we explored genetic and physiological merits of WRR for preventing rice blast and sheath blight diseases, both of which are important worldwide. Novel resistance genes to blast and sheath blight were identified in the two main biotypes of WRR in the US (those with black-colored hulls and those with straw-colored hulls) and can be used as new sources of disease resistance for breeding. Twenty-eight accessions of WRR from the southern USA were characterized and placed in the USDA National Small Grains Collection and are available for breeding and identification of novel genetic factors to prevent biotic stress.



- **Technology Transfer**

  ✓ **<u>Interactions with the Research Community</u>**

  ✓ **<u>Informal Contacts</u>**

  On July 11th, Dr. Jeremy Edwards and Aaron Jackson provided sub-population analysis for some 178 rice accessions being used by researchers at Texas A&M University.

  From July 9-11, Dr. Ming-Hsuan Chen and Mr. Matthew Schuckmann provided training and detailed protocols to a private breeder from Texas on grain quality trait analyses along with references related to genes and molecular markers controlling these grain quality traits.

  ✓ **<u>Rice Germplasm Distributed</u>**

  During July, 362 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States and Israel. Seed increases of 16 rice global accessions were provided to the NSGC for public distribution.

- **Stakeholder Interactions**

  On July 12th, Dr. Anna McClung gave a webinar to participants at the Texas A&M Annual Rice Field day at Beaumont, TX as part of an Organic Integrated Pest Management workshop. She discussed progress in using cover crops to reduce weed pressure and increase soil fertility and selection of rice varieties best suited for organic rice production. The workshop was attended by ~30 stakeholders.

On July 26th, Dr. Anna McClung met with private consultants to review protocols for producing purified seed (Headrow, Breeder and Foundation) in accordance with state seed laws.

On July 27th, Dr. Yulin Jia visited with a Mr. Kurt Unkel, rice grower in Kinder, LA, to discuss sustainable rice production practices to control diseases and optimize yields.

- **Education and Outreach**

In early July, Ms. Abbie Milliken (9th grade, L) and Ms. Hildana Tibebu (8th grade, R) were involved with job shadowing with researchers at DBNRRC. Both had participated in a girls STEM summer program offered by The Museum of Discovery in Little Rock which was hosted for one day at the DBNRRC. Abbie made genetic crosses, collected chlorophyll data, and helped measure photosynthesis and leaf temperatures in a field study. Hildana spent two days at the center where she learned to quantitate DNA, perform genetic marker analysis, and conducted rice grain chemistry analyses and plant disease assessments.