



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



JULY and AUGUST 2020

MONTHLY RESEARCH HIGHLIGHTS

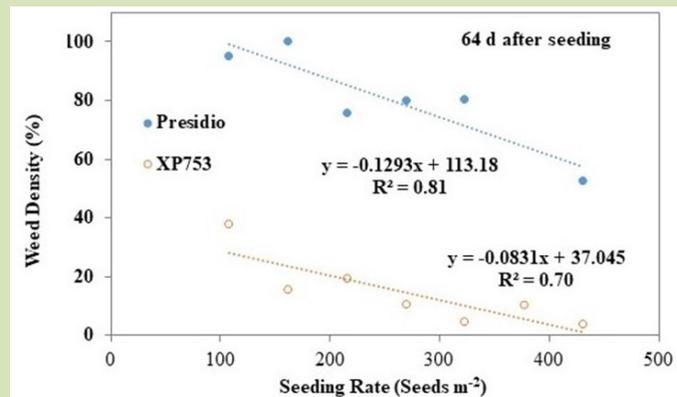
For More Information: Dr. Anna McClung, Research Leader/Center Director
anna.mcclung@ars.usda.gov

● **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Identify genetic plant growth efficiency mechanisms to increase crop productivity with improved cultivars suited to organic production conditions

Li, X., Dou, F., Watkins, K.B., Wang, S., Chen, K., Zhou, X., McClung, A.M., Storlien, J.O., Hons, F.M. 2020. Seeding rate effects on organic rice growth, yield, and economic returns. *Agronomy Journal*. <https://doi.org/10.1002/agj2.20304>.

The demand for organically produced food is the fastest growing sector of the U.S. food industry with an annual increasing rate of over 6%. Although organic rice production in the U.S. has increased dramatically, it still is not to the level to meet the strong market demand. The biggest production constraint in organic rice is yield losses due to weeds since traditional herbicides are not used. This study was conducted to determine the optimum seeding rate to use in organic rice production systems as a means of decreasing weed pressure and maximizing economic returns. A representative inbred cultivar, Presidio, and hybrid cultivar, XP753, were used in the study as both are options for organic growers, although the price of hybrid seed is much greater and a significant economic variable. The study was conducted over two years and seven seeding rates were used ranging from 108 to 431 viable seed per sq. m. Yield linearly increased with increased seeding rates for both cultivars, with the highest yields obtained at the highest seeding rates. Models were used to determine the economic optimum seeding rate which was 87 kg ha⁻¹ for Presidio and 48 kg ha⁻¹ for XP753. Producers could expect a yield of 3053 kg ha⁻¹ and an economic return of \$1288 -\$1346 ha⁻¹ for Presidio and a yield of 5835-6092 kg ha⁻¹ and an economic return of \$1986-\$2686 ha⁻¹ for XP753. These results contribute to filling the knowledge gap of how to optimize organic rice production practices and provide a reference to develop improved management strategies.



- **Technology Transfer**

- ✓ **Interactions with the Research Community**

On July 1st, Dr. Trevis Huggins, Geneticist and Curator of the Genetic Stocks Oryza (GSOR) collection, provided information to a researcher at Duke University regarding the optimal long-term storage conditions for rice seeds.

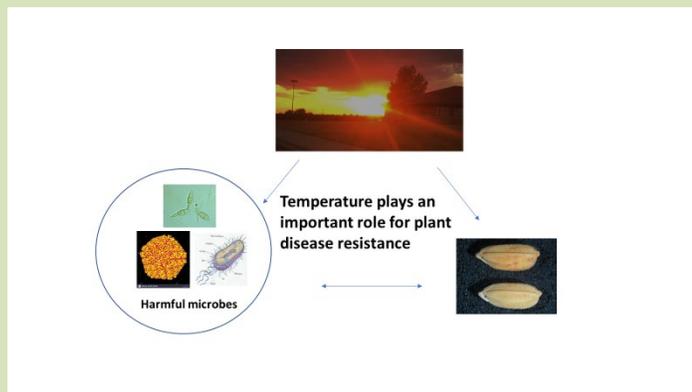
On July 2nd, Dr. Yulin Jia, Plant Pathologist, provided advice to a scientist at the National Institute of Crop Science, RDA, Korea on using markers linked to the broad spectrum *Pi-ta* blast disease resistance gene.

During mid-July, Dr. Ming-Hsuan Chen, Cereal Chemist, distributed rice samples of four varieties to all the southern state rice breeding programs along with the whole milling yield and head rice yield results from these samples obtained by the Federal Grain Inspection Service, Stuttgart, AR. These samples will be used to standardize milling machines in each state prior to milling samples from the 2020 research studies.

On July 22nd, Dr. Yulin Jia, Plant Pathologist, provided knowledge on the use of resistance genes to control rice blast disease to a US university rice breeder.

On August 4th, Dr. Yulin Jia, Plant Pathologist, became a Fellow of the American Phytopathological Society during a virtual award ceremony. Dr. Jia received this recognition based upon seminal contributions to the advancement of plant genetics, genomics and pathology, and to the development of effective control methods for rice diseases. He has focused most of his career on understanding the plant- pathogen interaction of the rice blast fungus, which is the most important disease threat to rice production around the world.

Dr. Yulin Jia chaired the APS-Chinese Society of Plant Pathology (CSPP) working group and teamed up with the Molecular Cellular Phytopathology subcommittee that organized two symposia for the 2020 Plant Health- Annual Meeting of American Phytopathological Society (APS) that was held virtually in mid-August with about 2400 participants. Dr. Jia presented two talks titled ‘Temperature impacts on the effectiveness of the rice blast resistance gene *Ptr*’ and ‘Structural and functional characterization of an atypical rice blast resistance gene *Ptr*’.



✓ **Rice Germplasm Distributed**

During the month of July, 428 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States, India, South Korea, Turkey and the United Kingdom.

During the month of August, 923 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States.

• **Stakeholder Interactions**

On July 7, Dr. Anna McClung provided information on rice cultivars and production practices to a small business interested in producing shochu, a Japanese style vodka, in the USA.

Only July 20th, Drs. Anna McClung and Trevis Huggins presented an overview of pure seed production activities for several USDA-ARS rice cultivars and two pending new releases to the annual meeting of the Texas Rice Improvement Association, a non-profit foundation rice seed program in Beaumont, TX.

On July 31st, Drs. Yulin Jia and Anna McClung provided information to a New York state rice grower on identification of a rice disease and best management practices.

During August 12-25, Dr. Anna McClung met with growers from Arkansas, Texas, Mississippi, and South Carolina to discuss production of pure seed sources of USDA ARS rice varieties for commercial production in 2021.

• **Education and Outreach**

Paul Braithwaite began working with Dr. Georgia Eizenga, Research Geneticist, on May 26, 2020. Previously, Paul spent over 13 years as an aircraft mechanic and recently he decided to return to college to be trained in Information Technology. This year Paul is gaining experience in rice research working with wild, ancestral species and unadapted rice germplasm. We are glad to have Paul, a non-traditional student employee, as part of the rice research team.



On July 13th, Dr. Anna McClung provided 10 rice samples of important rice varieties from around the world for a “World Population and Food Prospects” class being taught by Dr. Bob Patterson at North Carolina State University.

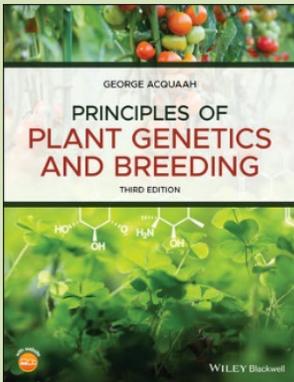
On July 19 and August 13, Dr. Jinyoung Barnaby attended a virtual Korean-American Women in Science and Engineering (KWise) organizing committee meeting as the Washington DC chapter president to set up the 2020 nationwide KWise meeting, which will be held on October.

In August, undergraduate student, Mr. Andy Bae, at University of Maryland, College Park, completed a summer internship program with Dr. Jinyoung Barnaby, Plant Physiologist. His internship was focused on investigating genetic variation of rice root traits in response to temperature and phosphorus treatment. (Andy, pictured on right, washing roots of rice plants prior to analysis).



On August 28th, Dr. Anna McClung, provided information to Garden and Gun magazine regarding production of heirloom rice varieties and their use in developing new varieties for the southern USA.

On August 28th, Dr. Anna McClung provided information on choice of a rice cultivar for use in a regenerative agricultural system for a grower in Louisiana.



On August 31st, the 3rd edition of a plant breeding book that includes a section on rice breeding by Dr. Anna McClung, Research Geneticist, was published by Wiley.

See the web version of all DBNRRC research highlights at:

<https://www.ars.usda.gov/southeast-area/stuttgart-ar/dale-bumpers-national-rice-research-center/docs/monthly-research-highlights/>