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

OCTOBER 2022

MONTHLY RESEARCH HIGHLIGHTS

For More Information: Dr. Yulin Jia, Acting Research Leader/Center Director
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- **Technology Transfer**

  - ✓ **Interactions with the Research Community**

    On October 3, Dr. Yulin Jia led a field tour to Dr. Samuel Gnanamanickam, Agricultural Consultant/Plant Pathologist & PGPR Pioneering Scientist, Fort Worth, Texas. Subsequently they discussed research on rice diseases with Dr. Yeshi Wamishe, Extension Plant Pathologist of University of Arkansas Rice Research and Extension Center (UA RREC).

From L to R: Drs. Wamishe, Jia and Gnanamanickam. Picture was taken at UA RREC.

On October 7, Dr. Yulin Jia introduced DBNRRC research program and led a field tour of DBNRRC research to Dr. Karen Mencl, Professor of the Ohio State University, and Dr. Larry Antosch, Senior Director of Ohio Farm Bureau, Columbus, OH.

October 7 – 18, Drs. Yulin Jia, Shannon Pinson, and Anna McClung communicated in-person and via email with Dr. Scott Lafontaine, Food Science Department, University of Arkansas, Fayetteville, to provide advice on selection of rice germplasm for evaluating effects of rice grain starch, antioxidant, and aroma qualities as ingredients for various beverage markets. ARS scientists provided Dr. Lafontaine with grain samples of nine rice varieties.

On October 31, Dr. Yulin Jia provided two blast cultures to Dr. Satish Ponniah of University of Arkansas at Pine Bluff (UAPB), and Heather Box, Biological Science Lab Technician showed Dr. Ponniah's graduate students Rehhan Mutethia and Bishnu Prasad Joshl how to collect blast from oatmeal plates. This is ongoing collaborative research between DBNRRC and UAPB on the development of novel strategies to control rice blast disease.

✓ **Rice Germplasm Distributed**

During the month of October 1492 rice genetic stocks were shipped to researchers in Belgium and the United States.

During the month of October, Eclipse, the first US medium grain pre breeding line with superior "Calrose" grain quality that possesses the broad-spectrum blast resistance genes *Pi-ta* and *Ptr* was distributed to breeders of Rice Tec, Inc, and UA RREC for development of disease resistant medium grain rice varieties.

- **Education and Outreach**

On October 19, Dr. Jeremy Edwards and Dr. Jai Rohila traveled to the University of Arkansas at Pine Bluff (UAPB) [illegible] as invited guests to attend the USDA-ARS student internship final presentations. This is a new summer internship program that was established this year by UAPB and USDA-ARS to give undergraduates hands-on research experience that will help them apply what they've learned in the classroom to real-world situations. After the interns' presentations, Dr. Edwards and Dr. Rohila spoke about their enthusiasm for the program and future opportunities for internships at the DBNRRC. John Mitchell, an intern co-mentored by Dr. Edwards and Dr. Rohila, and advised by Dr. Sathish Ponniah (UAPB), presented his summer research project on identification of genetic factors that help rice grow with less water. For more details, see the article on John's internship in the Stuttgart Daily Leader: https://www.stuttgartdailyleader.com/agricultural-research-service-internship-leads-to-uapb-student-being-employed/

From L to R: Dr. Jeremy Edwards, John Mitchell, Erikton Goodloe, Trent Wills, Kur'an Suluki, Madison Purifoy and Dr. Jai Rohila

On October 19, Chris Isbell, a rice farmer in Arkansas (a multi-generational family rice farm located in Central Arkansas with a focus on the sustainable production of quality rice) visited Dr. Yulin Jia (Research Plant Pathologist/acting Center Director /Research Leader) and plant pathology team (Heather Box, Paul Braithwaite) to examine disease resistant premium medium grain improvement program at DBNRRC. (From left to right, Mr. Isbell, Dr. Jia and Mr. Braithwaite).

From L to R: Mr. Isbell, Dr. Jia and Mr. Braithwaite

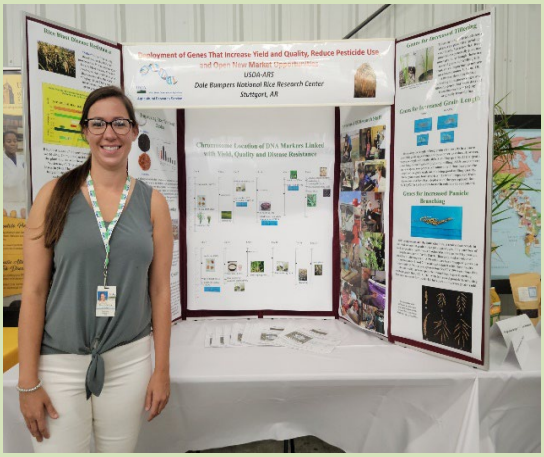
Dr. Yulin Jia grew up as a farmer's son in a small town in southwest China where rice, wheat and soybean are grown. As a child helping to manage the farm, he noticed yellow powder on rice grains and wheat heads during harvest that he later learned were rice false smut disease and wheat rust disease, respectively, when he attended a local agricultural college. Because of his interest in solving disease in agriculture, he worked with a pathologist to evaluate different pesticides for vegetable crops. After graduation, he was assigned to work in an Extension Bureau as an Extension Agronomist. During that period, he performed field plot experiments on farmers' fields, broadcasted farming practice daily using a radio broadcast, and taught farming in a vocation school.

He was later selected to be a candidate for a farm exchange to West Germany and attended a German language school to gain a proficiency with the language. However, his intended trip to Germany failed, and he was selected to be an exchange student through a program called Communicating for Agriculture Exchange Programs (CAEP) in USA (https://caep.org/). His first host was a viticulture farmer in a small town called Palisade located in the western slopes of Colorado. In Colorado, he was involved in producing grape cuttings in greenhouses for vineyard, packing gift apples, pruning grapevines, and producing apple cider. After this experience, he wanted to learn how to manage citrus groves and found another host, Mr. Robert Edsall in Vero Beach, Florida. During his time in Florida, he was involved in pruning and removing citrus trees infected by citrus tristeza virus. He observed discoloration of infected branches of tree and sought help in a Citrus Research and Education Center in Lake Alfred, Florida. He first attempted to learn how to control citrus snow scale using wasps and quickly learned that this technique was not easy to extend to citrus farmers. He then began to learn genetics and biotechnology with the hope that he can control plant disease without pesticides. He started with tissue culture, embryo rescue, and ended by producing seedling triploids of citrus by diploid and tetraploid crosses for his master's degree at the fruit crop department of University of Florida, Gainesville.

After graduation with a MS degree, he then dived into research on tomato-pathogen interactions in Dr. Greg Martin's lab in Purdue University for his PhD dissertation research. At Purdue, he and his team demonstrated molecular basis of plant immunity to bacterial disease. After earning his PhD, he returned to rice research as a Postdoc Research Associate at Dr. Barbara Valent's lab in DuPont where he obtained more training in biochemistry and biotechnology. He showed that the gene for gene hypothesis proposed several decades ago by Dr. H. Flor is one of the common mechanisms of disease resistance. This finding provides the foundation for breeders to develop disease resistant crop plants. In the summer of 2000, he became a Research Plant Pathologist at ARS DBNRRC in Stuttgart. For the past 21 years

he has developed an internationally recognized research program on host-pathogen interactions. For example, he led the team that cloned an atypical disease resistance gene *Ptr* in rice further demonstrating the novelty of plant immunity and acquired a new tool for developing disease resistant plants. It was a scientifically challenging project because *Ptr* is located on a chromosomal region that is highly suppressed and innovative team approaches were crucial for success. In 2020, he was named as a Fellow by American Phytopathological Society. Since October 2021 he has been serving as acting Center Director and Research Leader for DBNRRC in Stuttgart, AR.

Heather Box grew up in Arkansas County and knew by a young age the importance of the food grown in this part of the state. Her father made a living selling John Deere equipment for the area farmers and that allowed for a great life growing up. It was not until she traveled passed the current DBNRRC, as it was being constructed, that the questions began flowing. She wondered the reasons for such a place. After graduating high school with honors and knowing science was fascinating, she was led to major in biology. Most college years were spent at the University of Arkansas in Fayetteville where she was also employed by Alpha Omicron Pi Sorority as the sole representative on campus before colonization. Close to graduation, she met her late husband, Corey, and they moved together to Joplin, MO, where she graduated from Missouri Southern State University with a BS in Biology. After graduation, a friend passed along her resume and before she knew it, she was headed home to ARCO (Arkansas County) with Corey and their dogs. Just two short years later they added baby girl Ayla to their family.



Over the past 12 years she has gained knowledge in rice physiology, chemistry, pathology, genetics, and food quality. Gaining more understanding of the motto of DBNRRC every day. Unlocking her abilities one project at a time has been interesting, fun and has fulfilled a huge part of her life. She's mapped QTLs within populations using her phenotypic data and identified novel genes. Her service work has led to the release of domestic cultivars based on desirable qualities and disease resistance.

Heather now spends most of her time being a full-time mom and technician under Dr. Yulin Jia. She hopes to instill in her daughter the love for research and science. Heather also participates in outreach programs and is never shy to share her knowledge. All in all, she wants to make a positive impact on everyone she meets and is thankful for the role she plays at DBNRRC.

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/