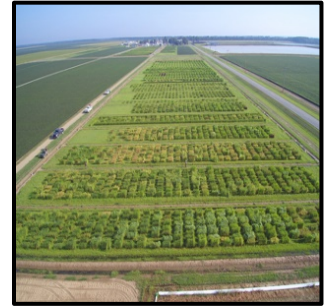




**Dale Bumpers National Rice Research Center
USDA-ARS
Stuttgart, Arkansas**

MAY 2019



MONTHLY RESEARCH HIGHLIGHTS

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- **Recent Scientific Publications**

Barnaby, J.Y., S.R.M. Pinson, J.B. Chun, and L.T. Bui. 2019. Covariation among root biomass, shoot biomass, and tiller number in three rice populations. *Crop Science*
doi:10.2135/cropsci2018.09.0595.

<https://dl.sciencesocieties.org/publications/cs/articles/0/0/cropsci2018.09.0595>

Breeding for improved rice root systems could improve crop yield by increasing water and nutrient uptake. However, the high labor required for collecting and evaluating roots grown under field conditions limits the ability to select for altered root size or structure. Tiller and root development are physiologically connected in rice, with each tiller and its associated roots emerging from the same node on a rice stem. This study tested the hypothesis that genes affecting tiller number (TN) also have sufficiently large effect on root biomass (RB) and shoot biomass (SB) such that TN can serve as a proxy for selecting for improvements in RB and SB. Three genetic mapping populations were used to evaluate the robustness of TN-RB-SB relationship across different complements of TN genes. In all three populations, selection for high vs. low TN caused corresponding shifts in RB and SB, suggesting that TN genes affect RB and SB through pleiotropy or linkage. However, when the effect of individual TN loci on RB was evaluated in a subset of one of the three populations, just one out of six TN-loci was found to impact RB. This study demonstrated that some genes affecting tiller production have such a large effect on root biomass that breeders can use rapid, nondestructive tiller count data in selecting for root biomass, but also showed the value in conducting additional research to identify RB loci that are independent from TN.



- **Technology Transfer**

- ✓ **Interactions with the Research Community**

On May 15th, Dr. Brook Moyers, Assistant Professor of Biology at the University of Massachusetts, Boston presented a seminar on “G x E in the rice Global MAGIC population under drought stress” regarding research that she participated in at the International Rice research Institute, in Los Banos, the Philippines. This was followed by one-on-one visits with the research staff at DBNRRC to discuss opportunities for collaboration.



May 27-31 the 8th International Rice Blast Conference (IRBC) took place in Chengdu, China. Dr. Yulin Jia, Molecular Plant Pathologist, presented a plenary talk entitled “Analysis of structural and functional relationship of rice blast resistance gene Ptr in rice germplasm”. The conference was attended by 329 researchers from 18 countries. The IRBC takes place every three years, with the location rotated among countries where rice blast disease is a major threat for rice production and food security.



On May 31st, Dr. Anna McClung provided information to a researcher at New York University studying the market land-scape for locally grown rice in the Northeast.

- ✓ **Rice Germplasm Distributed**

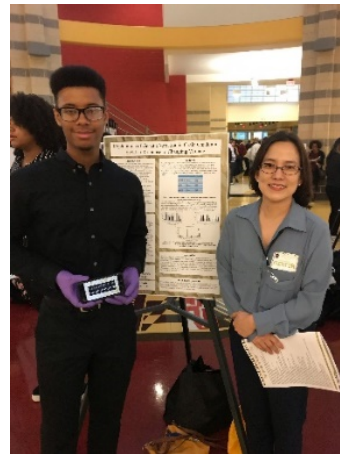
During April, 183 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States, Belgium, Canada, and Iceland.

- **Stakeholder Interactions**

On May 7th, Dr. Anna McClung provided seed of 16 early season global rice cultivars for field planting trials in Indiana.

- **Education and Outreach**

On May 2, two high school students, Ms. Tristan Johnson and Mr. Joshua Lewis, under the mentorship of Dr. Jinyoung Barnaby (DBNRRC), presented a poster entitled “Exploring naturally existing genetic variation in grain chalk formation in response to changing climate” at the Oxon Hill High School STEM Fair. (L): Ms. Tristan Johnson and Dr. Jinyoung Barnaby, (R): Mr. Joshua Lewis and Dr. Jinyoung Barnaby. Joshua was selected as one of top five best presenters.



On May 4, Dr. Jinyoung Barnaby participated in Korean-American Women in Science and Engineering NIH-Greater DC Chapter joint symposium and served as a moderator for the panel discussion session on Life Science and Data Science. She was also elected as president of the DC Greater Chapter of Korean-American Women in Science and Engineering society for 2019-2020.

On May 14, approximately 100 6th graders from Dewitt, AR visited DBNRRC. The students participated in three hand-on activities: DNA extraction with the Molecular Genetics laboratory, rice processing, milling and grain chemistry analyses with the Grain Quality laboratory, and rice disease evaluation in the greenhouse with the Plant Pathology laboratory. Participants were Melissa Jia, Aaron Jackson, Brenda Lawrence, Dr. Trevis Huggins, Lorie Bernhardt, Quynh Grunden, Jace Everette, Dr. Ming Chen, Heather Box, Alan Sites, and Dr. Yulin Jia.



On May 16, Dr. Cristina Fernandez-Baca (below left picture, in orange top) talked to visitors from the Maryland native plant society group who were on a tour of USDA-ARS BARC facilities led by Dr. Lewis Zsika. She and Dr. Jinyoung Barnaby showed their greenhouse experimental setup and explained their research project on arsenic uptake in rice. Drs. Fernandez-Baca and Barnaby are DBNRRC researchers conducting studies in collaboration the Alternative Cropping System Lab in Beltsville, MD.



On May 17, Dr. Jinyoung Barnaby's proposal entitled "Altering plant-soil-microbe interactions through irrigation management reduces rice grain arsenic accumulation" was selected to receive funding from Friends of Agricultural Research – Beltsville (FAR-B) that will support a summer 2019 intern.