



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



AUGUST 2019

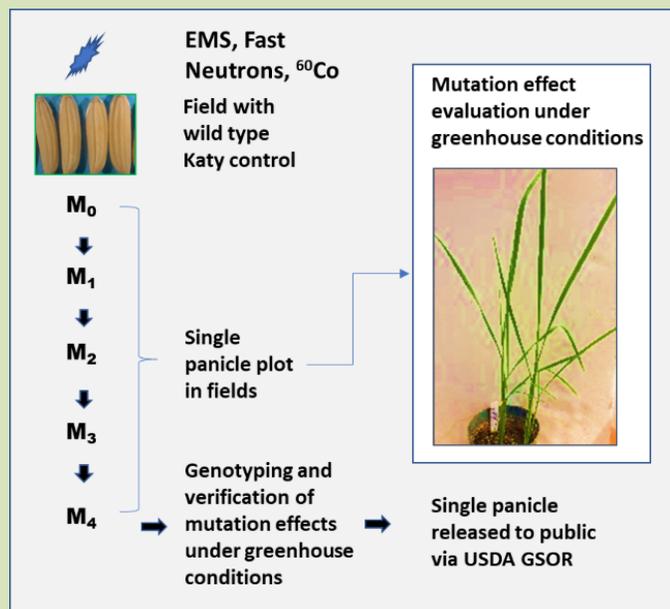
MONTHLY RESEARCH HIGHLIGHTS

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● **Recent Scientific Publications**

Yulin Jia, Zhonghua Wang, **Melissa H Jia**, **J. Neil Rutger**, Karen A.K. Moldenhauer. 2019. Development and Characterization of a Large Mutant Population of a Rice Variety Katy for Functional Genomics Studies and Breeding. *Crop Breeding, Genetics and Genomics* 2019;1:e190014. (published on line: August 19, 2019).
<https://doi.org/10.20900/cbgg20190014>

Katy is a US adapted long grain tropical japonica variety that is important for functional genomic studies and breeding. One method of studying the rice genome involves applying a chemical or physical mutagen to rice seeds, which causes genetic variation to occur, and allows scientists to select and observe the functions of genes. A mutant population of Katy, consisting of 23,558 lines, was created using three common mutagens: the chemical mutagen ethyl methane sulfonate (EMS) and the physical mutagens, fast neutron and 60- cobalt gamma radiation. The ability of each mutagen, used at differing levels, to produce mutations in the plants was evaluated by determining the frequency of seedlings lacking in chlorophyll in the third and fifth generation of selfing following the mutagen treatment. It was discovered that EMS at the highest concentration, 1.2%, produced the most chlorophyll deficient mutations in both generations. However, all mutagens produced reasonable amount of mutations indicating that the developed population will be useful for future rice genomic studies and breeding.

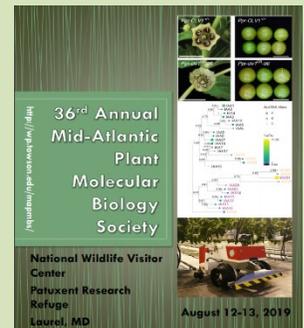


- **Technology Transfer**

- ✓ **Interactions with the Research Community**

Drs. Jeremy Edwards, Trevis Huggins, Santos Sharma and Anna McClung from DBNRRC visited the Dale Bumpers Small Farms Research Center in Booneville, AR on August 8. They met with Research Leader Dr. Philip Owen and Dr. Joan Burke, as well as, Dr. Amanda Ashworth of the Poultry Production and Product Safety Research Center located in Fayetteville, AR, to discuss opportunities for collaboration using imaging technology for mapping soil and field variability.

On August 12-13, 2019, Drs. Jinyoung Barnaby and Fernandez-Baca attended the 36th Mid-Atlantic Plant Molecular Biology Society meeting (MAPMBS) held in Laurel, Maryland, and presented posters entitled “Exploring naturally existing genetic variation in grain chalk formation in response to changing climate” and “Identifying genomic regions influencing variation in inorganic arsenic accumulation in rice cultivars”, respectively. The annual conference includes scientists in the Mid-Atlantic region.



On August 27-28, Dr. Jeremy Edwards was invited to attend the USDA-ARS Artificial Intelligence/Machine Learning Workshop held in Gainesville, FL on the University of Florida campus. The workshop is designed to introduce the application of machine learning methods for life science research. Applications for rice research include classification and measurement of rice plant traits and finding patterns in traits and environment interactions that predict plant response, e.g., yield performance under environment-induced stress.



On August 29, 2019, Dr. Yulin Jia sent one reference sheath blight isolate *Rhizcotonia solani* AG1-IA RM01040 (RR0140) to a Researcher at Colorado State University to study the effect of gene knockouts in rice to infection by the sheath blight pathogen. The isolate RR0140, a slow growing isolate purified from sheath blight infected rice tissue found in Arkansas grown rice, has been used to map resistance genes to sheath blight disease and elucidate the molecular mechanisms of plant innate immunity.



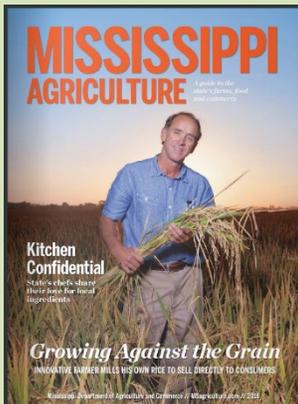
Sheath blight symptoms on a rice leaves

✓ **Rice Germplasm Distributed**

During the month of August, 24 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the United States.

• **Stakeholder Interactions**

On August 16th, Glenn Roberts (right) of Anson Mills, Columbia, SC, visited with Dr. Anna McClung to look at new potential specialty varieties in 2019 field trials. Anson Mills markets heirloom grains grown organically to restaurants.



On August 23, Mike (left) and Lawrence Wagner, from Two Brooks Farms in Sumner, MS, visited with Dr. Anna McClung regarding health beneficial aspects of rice varieties with colored bran.

• **Education and Outreach**

Dr. Jinyoung Barnaby gave a lab and facility tour to Dr. Sarah Beebout, a National Program Leader of NP212 at USDA-ARS, and Mr. Theophilus Baah, an agronomist from the Ministry of Agriculture, Republic of Liberia, on August 7th and 16th, respectively. Research on genotype (G), environment (E), and management (M) interactions and their impact on rice production and grain quality were discussed.



On August 19th, Dr. David Gealy gave a brief overview and tour of the DBNRRRC facility and activities to two students visiting from Lithuania and their sponsor, who was an architect instrumental in the original design of the DBNRRRC facility.

On August 23, Drs. Jinyoung Barnaby and Cristina Fernandez-Baca, Mrs. Martha Tomecek and Ms. Tristan Johnson visited the rice production fields located in Ashton, Maryland, where Dr. Nazirahk Amen, of Purple Mountain Organics, is growing dry-land rice. The dry-land growing technique (drip irrigation system) is modeled after techniques from the System of Rice Intensification-a method designed to reduced methane emissions while sustaining grain yield.



(From left to right) Cristina Fernandez-Baca, Jinyoung Barnaby, Nazirahk Amen, Amanda Amen, and Martha Tomecek