

December 2016

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

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1. Recently Accepted Publications

ARS Anticipated Product: Enhanced knowledge of how plants interact with the environment which is needed for developing resilient, well-adapted crops.

Shardendu K. Singh, **Jinyoung Y. Barnaby**, Vangimalla R. Reddy and Richard C. Sicher. 2016. Varying response of the concentration and yield of Soybean seed mineral elements, carbohydrates, organic acids, amino acids, protein, and oil to phosphorus starvation and CO₂ enrichment. *Front Plant Sci.*, 27 December 2016 (<https://doi.org/10.3389/fpls.2016.01967>)

Soybean is one of the most important sources of protein and vegetable oil for both human and animal nutrition. Major nutrients for crop production include nitrogen, phosphorus (P), and potassium and P reserves are being rapidly depleted. Moreover, atmospheric CO₂ concentration is expected to double from the current level by the end of this century. Phosphorus deficiency and elevated CO₂ often have opposite effects on plant growth and their interaction might alter seed nutritional quality. To evaluate this, soybean was grown in a controlled environment at either sufficient or deficient levels of P and under ambient and elevated CO₂. Results showed that P deficiency primarily reduced concentrations of the oil and mineral elements and the content of seed components consistently declined under P starvation except for several amino acids. The elevated CO₂ decreased the concentration but increased the total content of the majority of seed components in soybean plants when there was sufficient P nutrition. These results indicate that adequate P supply may be necessary for the crop to obtain the beneficial effects of elevated CO₂ on the overall yield of various seed components. The study suggests the importance of nutrient availability to optimize crop production under a changing climate.

2. Technology Transfer

a. Formal Events:

To Non-research Stakeholders

To Research Community

On December 13 and 14, 2016 Drs. Jinyoung Y. Barnaby and Anna M. McClung hosted Dr. Wujae Kim, and Mr. Jaebum Chun from the Rural Development Administration-National Institute of Crop Science, South Korea. They are counterparts on a cooperative research grant project funded from 2016-2018 entitled “Exploring rice genetic resources for use in adapting to climate change and mitigating greenhouse gas emissions”. During their visit, they were given an overview of current greenhouse gas emissions research as well as the center’s other research activities, and learned the whole procedure of measuring methane gas emissions.



On December 22, 2016 Dr. Yulin Jia and other University colleagues proposed two special symposia titled 1) ‘New insights into NLR (nucleotide-binding/leucine-rich repeat) receptors in plant immunity: pathogen recognition, molecular interactions, and novel disease control strategies and Unfriendly and 2) Beneficial Plant-Parasite Interactions to the American Phytopathological Society. Both were accepted and will be held at 2017 meeting from August 5 to 9, San Antonio, Texas.

<http://www.apsnet.org/meetings/annual/Pages/default.aspx>.

b. Informal Contacts

Dr. Jai Rohila of ARS-DBNRRC, Stuttgart, AR, guided Dr. Pam Ronald Lab at University of California-Davis on rice protein isolation, co-immunoprecipitation, and detection of protein-of-interest using peroxidase-anti-peroxidase antibody.

c. New MTAs

d. Germplasm Exchanged:

During December, 134 rice accessions from the Genetics Stocks *Oryza* (GSOR) collection were distributed to researchers in the US and Belgium, China, and Spain.

3. Education and Outreach

4. New Significant Research Collaborations