

Carrie Ortel Wins PhD Student Competition at the 2021 ACPA Research Conference

Carrie Ortel won the PhD student competition with a presentation titled “Monitoring and Correcting Potassium Hidden Hunger in Arkansas Soybean”. The presentation stated potassium (K) deficiency is one of the most important yield limiting factors in Arkansas soybean (*Glycine max*) production and can be difficult to identify due to the lack of visual symptoms. Plant nutrient concentrations can change significantly over the course of the growing season and oftentimes provide a moving target for nutrient sufficiency. Interpretations of diagnostic tissue-K concentrations are only adequate for very specific growth stages and prevent interpretation and successful identification of hidden hunger across the growing season. These challenges lead Slaton et al. (2020) to delineate the crop response to fertilizer-K at key growth stages and develop a dynamic critical tissue-K concentration for interpretation of sufficiency from the R2-R6 growth stages. However, the rate of fertilizer-K necessary to correct the various levels of deficiency and achieve maximum yield remains unknown. Our objectives were to correlate the trifoliolate-K with relative grain yield, to calibrate the rate of fertilizer-K needed to achieve 95% relative grain yield, and to evaluate the economic viability of in-season K applications to soybean. Treatments included multiple rates of granular muriate of potash at 15 days after R1 (DAR1), 30 DAR1, and 45 DAR1. Research was conducted in 2021 across multiple fields and soil-test K levels. The results indicate that soybean responded positively to K fertilization ($P < 0.10$) at 15 and 30 DAR1 when trifoliolate-K is below the critical concentration, but not at 45 DAR1. Therefore, in-season applications are effective at maintaining yield if applied during early reproductive growth. However, a delay in application timing may jeopardize yield potential to a degree that is no longer profitable to correct. Calibrated K rates related to tissue-K concentrations for a given growth stage will enable producers to correct deficiencies in-season with the appropriate fertilizer rate to maximize yield and profit.

