INVESTIGATING THE NEED FOR SULFUR IN KENTUCKY WHEAT PRODUCTION

E. Ritchey and J. Grove
The University of Kentucky, Princeton, KY
Edwin.Ritchey@uky.edu (270) 625-8825

ABSTRACT

Sulfur (S) deficiencies in Kentucky wheat production are increasing due to a reduction in atmospheric S deposition, greater removal in grain and forage, and less S contamination in phosphorus fertilizers. The University of Kentucky currently does not provide S recommendations based on S soil test results. This is largely due to the Mehlich 3 soil test extractant not being correlated or calibrated for S response in Kentucky crops and the lack of S responsive fields. Surveys and studies were conducted to help develop guidance using soil testing for S fertility in winter wheat (*Triticum aestivum* L.) production in Kentucky. These will be discussed to describe the current state of S fertility in Kentucky. Tissue surveys were conducted on 70 fields in 2012 and 2013 with only one field resulting in tissue S concentrations below the reported sufficiency range of 0.15 to 0.65% S. This field was disturbed by fence row clearing, burning of bulldozer piles, and oil production - was considered an anomaly for Kentucky wheat production at that time. Large and small-plot research was conducted in wheat producing areas in 2016 using ammonium thiosulfate (ATS) in combination with UAN or UAN treated with both a nitrification and urease inhibitor. Soil samples for these studies were collected at 0 to 4 inch and 0 to 12inch depths and exhibited profile differences in S concentration between sites and depths. However, no yield differences were observed within location, only between locations. Areas at the University of Kentucky Research and Education Center (UKREC) that appeared to show S deficiency were paired with areas not exhibiting visual S deficiency symptoms and both areas were sampled. Tissue samples identified S deficient areas 75% of the time. The average yield reduction due to apparent S deficiency was 53 bu/A. Finally, a large-scale research plot at the UKREC, near the areas earlier showing S deficiency, was planted to wheat in 2024. Soil organic matter (SOM) averaged 3.01% and Mehlich 3 S (M3S) values averaged 23.2 lb S/A at the 0-to-4-inch sample depth prior to drilling wheat. Plots received either 120 or 150 lb N/A, with or without 20 lb S/A as ammonium sulfate (AMS). Wheat yields were 50 and 52 bu/A for the150 and 120 lb N/A rates and did not differ significantly. However, wheat yields were significantly different, at 37 and 64 bu/A for 0 and 20 lb S/A, respectively. The N by S interaction was not statistically significant. The yield response was purely due to S application. Although SOM and M3S levels suggested sufficient soil S to support wheat growth, wheat grain yield positively benefited from S addition. Sulfur residuality will be monitored in the following soybean crop. Additional wheat S fertility trials will be conducted to provide an understanding of S critical levels, and S fertility guidance, for Kentucky wheat production.