Spring Wheat Responses to Starter Fertilizer, Micronutrient and Root Inoculant

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Research Questions

Can we increase spring wheat yield and protein content with additions of (1) starter fertilizer (11-52-0@40 lb/ac), (2) copper, (3) zinc, (4) sulfur, and (5) root inoculants and their combinations?

Results

Highest wheat grain yield of 51.3 Bu/ac was observed with starter fertilizer (11-52-0@40 lb/ac) in addition to recommended NPK fertilizers but statistically different from only check treatment (32.7 Bu/ac). Grain protein content (12.9%) was highest with copper (@ 5 lb/ac) and sulfur (@10lb/ac) with recommended NPK but treatments were statistically same.

Application/Use

We will examine whether we can increase the grain yield and protein content by advanced soil fertility management practices with mid-row bander and nutrients.

Material and Methods

This is the first year of the three-year trial. Treatment combinations are (1)control (no fertilizer applied), 2. recommended N@ 130 lb N/ac, 3. starter fertilizer (11-52-0) @ 40 lb/ac, 4. sulfur @10 lb/ac (as ammonium sulfate), 5. copper @ 5 lb/ac, 6. zinc @ 3 lb/ac, 7. copper + sulfur (as $CuSO_4$ matching the amount of Cu and S with treatment 4 and 5) , 8. zinc + sulfur (as $ZnSO_4$ matching the amount of Zn and S with treatment 5 and 6), 9. copper + zinc + sulfur (as $CuSO_4$ and $ZnSO_4$ matching the amount of Cu, Zn and S with treatment 4, 5 and 6), 10. root inoculant (Trichoderma spp.) and 11. root inoculant+ (Trt. 9: copper + zinc+ sulfur). Trial was conducted at Glyndon, MN (Dave Watt farm). Plots are laid out in randomized block design with four replications. Plot size was 30 feet by 11 feet. Fertilizers were mid-row banded (Borgault) and planting was done at the end of May. Harvesting was done by a small-plot combine in August 2014. Initial values for soil nitrate nitrogen at 0-6 and 6-24 inch soil depth are 13 and 27 lb/ac, respectively.

Economic Benefit to a Typical 500 Acre Wheat Enterprise

Soil fertility management has potential to increase grain yield and protein content.

Figure 1. Mid-row banding of fertilizer materials with the help of Borgault unit for spring wheat during 2014 growing season at Glyndon, MN.

Figure 2. Spring wheat grain yield (Bu/ac) and protein content (%) in response to mid-row banding of nutrients during 2014 growing season at Glyndon, MN. Small letters indicate significance at 95% significance level and same letter indicate no significant difference between treatment.