STEINKE, KURT*, CHRIS BAUER, and ANDREW CHOMAS, Department of Plant, Soil, and Microbial Sciences, Michigan State University, Plant and Soil Sciences Building, 1066 Bogue Street, East Lansing, MI 48824. **Evaluation of nitrogen products to optimize sugarbeet production.**

## ABSTRACT

Increasingly unpredictable spring weather conditions and continued concern for Great Lakes water quality have placed greater emphasis on improving management of nitrogen (N) fertilizer applications and strategies to promote efficient fertilizer usage in sugarbeet production. Earlier research has indicated that 40 lbs. N/A applied as a 2x2 application at planting followed with 120 lbs. N/A at sidedress has resulted in positive root yields, but an increasing numbers of growers wish to pursue stale seed bed approaches to N management for the remainder of the N application. The question is do enhanced efficiency fertilizers including urease and nitrification inhibitors improve sugarbeet production and the efficiency of sugarbeet N applications as compared to conventional soluble N sources.

Field trials were initiated in 2014 and arranged as a randomized complete block with four replications. All treatments received 160 total lbs. N/A with 40 lbs. of this total applied as a 2x2 application at planting. Specific treatments included: 1) urea applied sidedress with light cultivation, 2) Super-U (urease and nitrification inhibitor) applied PRE, 3) urea with Agrotain Dry (urease inhibitor) applied PRE, 4) UAN applied sidedress with no cultivation, 5) UAN with Agrotain Ultra (urease inhibitor) applied sidedress with no cultivation, 6) urea applied PRE, 7) 3 gpa 10-34-0 applied in-furrow with urea applied sidedress, and 8) 75:25 ratio of PCU:Urea applied PRE. Digital Image Analysis (DIA) was used to quantify early- and mid-season top growth responses to nutrient application. Sugarbeet root yield, sugar quality, and net economic returns were measured.

Research data from 2011-2014 have shown 40 lbs. N 2x2 with 120 lbs. N sidedress has resulted in the best combination of tonnage and sugar quality with no differences in residual soil N after harvest as compared to lower rates of N application. With 25% of Michigan sugarbeet acreage now undergoing early harvest, data have shown few differences in net economic return at rates between 40 – 120 lbs N/A indicating growers pursuing this option may be able to reduce overall rates of N application. Digital image analysis was able to quantify early season positive responses to in-furrow N applications but no differences were noticed from the use of N inhibitors or slow-release N sources. Sugarbeet root yield and quality parameters were not influenced by N inhibitors or slow-release N in 2014. This response may have been due to a minimal number of large rainfall events in 2014 limiting N-loss conditions. Nitrogen inhibitors and slow-release N did significantly reduce sugarbeet stand loss from saltation as compared to soluble N sources applied at planting potentially allowing for greater N application rates applied before or at-planting when using these products. As water quality concerns throughout the Great Lakes Basin continue to increase, benefits to enhanced efficiency and protection products may need to be viewed from both an environmental and agronomic perspective.

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