

EFFECT OF MICRONUTRIENTS ON SUGARBEET YIELD AND QUALITY

Mohamed F. R. Khan¹ and Randy Nelson²

¹Extension Sugarbeet Specialist, North Dakota State University & University of Minnesota

²Research Technician, Plant Pathology Department, North Dakota State University

The objective of this research was to evaluate the effect of proprietary micronutrients on sugarbeet yield and quality.

MATERIALS AND METHODS

Field trial was conducted in Foxhome, MN and Prosper ND, in 2007. The experimental design was a randomized complete block with four replicates. Field plots comprised of six 30-foot long rows spaced 22 inches apart. Plots were planted on 3 and 9 May at Prosper and Foxhome, respectively, using Beta 4818 with 45 g of Tachigaren/kg seed. Terbufos (Counter 15G) was applied modified in-furrow at 12 lbs/A during planting to control sugarbeet root maggot (*Tetanops myopaeformis* von Röder; Diptera: Ulidiidae). Plots were thinned manually in mid-June to 41,580 plants per acre. Weeds were controlled with recommended herbicides (Khan, 2007), and hand weeding.

Treatments were applied with a 4-nozzle (8002) hand-held sprayer calibrated to deliver 20 gpa of solution at 40 p.s.i pressure to the middle four rows of plots. Treatments were applied at the six-leaf stage on June 12 and 21 days after (July 2) at Prosper, and June 18 and 21 days after (July 10) at Foxhome. Treatments were applied at rates as indicated in Table 1.

Plots were defoliated mechanically and harvested using a mechanical harvester on 24 and 26 September at Foxhome and Prosper, respectively. The middle two rows of each plot were harvested and weighed for root yield. Twelve to 15 random roots from each plot, not including roots on the ends of the plot, were analyzed for quality at the American Crystal Sugar Company Quality Tare Laboratory, East Grand Forks, MN. The data analysis was performed with the ANOVA procedure of the Agriculture Research Manager, version 6.0 software package (Gylling Data Management Inc., Brookings, South Dakota, 1999). The least significant difference (LSD) test was used to compare treatments when the F-test for treatments was significant ($P=0.05$).

RESULTS AND DISCUSSIONS

The data (Tables 1 and 2) indicate that there were no significant differences in recoverable sucrose per acre, recoverable sucrose per ton sugarbeet, net tons per acre, sucrose concentration and sugar loss to molasses in the treated plots compared to the untreated check at both Foxhome and Prosper. Recoverable sucrose was higher at Prosper, probably because of more rainfall in August and September (5.73 inches) which resulted in higher tonnage compared to Foxhome where there was lower rainfall in August and September (3.07 inches) resulting in lower tonnage but higher sucrose concentration. Base on one year's data, none of the micronutrients impacted sugarbeet yield and quality.

Table 1. Effect of micronutrients on sugarbeet yield and quality at Foxhome in 2007.

TREATMENT* AND RATE/A	RECOVERABLE SUCROSE		ROOT YIELD (T/A)	SUCROSE CONCENTRATION (%)	LTM** (%)
	(lb/A)	(lb/T)			
Untreated Check	6863	327	21.1	17.9	1.5
AGM 06018 1.5 pt/A @ 6 lf; AGM 06018 1.5 pt/A 21 d later	6959	333	21.1	18.1	1.5
(AGM 06018 + 07002) 1.5 pt/A @ 6lf; AGM 06018 1.5 pt/A 21 d later	6503	327	20.0	17.8	1.4
AGM 06023 1 gal/A @ 6 lf ; AGM 06023 1 gal/A 21 d later	7014	326	21.7	17.7	1.4
AGM 07002 2 quart/A @ 6 lf; AGM 07002 2 quart/A 21 d later	6513	330	19.9	17.9	1.4
LSD (P= 0.05)	1106	29	2.0	1.3	0.2

*Treatments were applied on 18 June (6 lf stage) and 10 July; untreated check was sprayed with water at 20 gpa.

**Sugar loss to molasses.

Table 2. Effect of micronutrients on sugarbeet yield and quality at Prosper in 2007.

TREATMENT* AND RATE/A	RECOVERABLE SUCROSE		ROOT YIELD (T/A)	SUCROSE CONCENTRATION (%)	LTM** (%)
	(lb/A)	(lb/T)			
Untreated Check	9363	288	32.9	16.0	1.6
AGM 06018 1.5 pt/A @ 6 lf; AGM 06018 1.5 pt/A 21 d later	8548	288	30.0	15.9	1.6
(AGM 06018 + 07002) 1.5 pt/A @ 6lf; AGM 06018 1.5 pt/A 21 d later	8869	287	31.2	15.9	1.6
AGM 06023 1 gal/A @ 6 lf ; AGM 06023 1 gal/A 21 d later	9709	290	30.2	16.0	1.5
AGM 07002 2 quart/A @ 6 lf; AGM 07002 2 quart/A 21 d later	9175	294	31.5	16.2	1.5
LSD (P= 0.05)	1147	20	2.7	0.9	0.2

*Treatments were applied on 1 June (6 lf stage) and 2 July; untreated check was sprayed with water at 20 gpa.

**Sugar loss to molasses.