

COMPARING YIELD AND QUALITY OF SUGARBEET AT DIFFERENT PLANT POPULATIONS

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INTRODUCTION AND OBJECTIVE

For many years, growers were advised to plant 150 plants per 100 ft. of 22'' row using conventional sugarbeet varieties for maximum recoverable sucrose. In 2003 and 2004, research done at North Dakota State University and the University of Minnesota showed that a plant population of 175 evenly spaced plants per 100 foot of 22-inch wide rows at the 6-leaf stage was ideal for maximum recoverable sucrose per acre. This spacing was effective for both a high tonnage and a high sugar conventional sugarbeet variety.

In 2008, sugarbeet growers started planted Roundup Ready sugarbeet and currently, over 98% of the US sugarbeet acreage is using this technology. Research using Roundup Ready sugarbeet showed that a wide range of plant population (75 to 225 plants per 100 ft tow) resulted in similar tonnage, quality and recoverable sucrose. As such, the recommendation of growing 175 plants /100 ft of row for highest recoverable sucrose were maintained. Recently, other reports suggested that higher yields could be achieved at 300 plants per 100 ft of row. As such, the objective of this research was to determine the plant population of a widely grown Roundup Ready variety that will provide the highest recoverable sucrose.

MATERIALS AND METHODS

A field trial was conducted at Prosper, ND in 2016. The experimental design was a randomized complete block with four replicates. Field plots comprised of six 25-foot long rows spaced 22 inches apart. Plots were planted on 2 May with Hillehog 4448RR. Seeds were treated with Vibrance, Tach 45 and CMX. Seed spacing within the row was 2.4 inches and thinned to prescribed population at the 6-leaf stage. Rhizoctonia was controlled with a broadcast application of Quadris on 3 June. Weeds were controlled with two glyphosate applications on 7 and 28 June. Cercospora leaf spot was controlled with three fungicide applications on 19 July, 9 and 23 August.

Plots were defoliated mechanically and harvested using a mechanical harvester on 13 September. The middle two rows of each plot were harvested and weighed for root yield. Twelve to 15 representative 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 8 software package (Gylling Data Management Inc., Brookings, South Dakota, 2010). The least significant difference (LSD) test was used to compare treatments when the F-test for treatments was significant.

RESULTS AND DISCUSSIONS

The research site was very dry before and after planting and did not receive any significant rainfall until May 22-31 when there was a total of 3.05 inches. At harvest, there were significant differences in mean root weight among the treatments with the lowest population (50 plants per 100 ft of row) having significantly higher mean root weight and the highest population (300 plants) with the lowest mean root weight. The lowest population also had significantly lower root yield, sucrose concentration, recoverable sucrose per ton, and recoverable sucrose per acre. The 100 plants treatment also had significantly lower tonnage, recoverable sucrose per ton, and recoverable sucrose per acre compared to the highest population. There were no significant differences in tonnage, sucrose concentration, recoverable sucrose per ton and recoverable sucrose per acre between the 150 to 300 plants treatments. The results indicated that the aim should be to strive for a population of about 175 (to 200) plants per 100 foot of row (22-inches), and should there be a reduction of stand due to biotic or abiotic factors, populations of 150 or even 100 plants per 100 foot of row can still provide acceptable yields and recoverable sucrose per acre.

Table 1. Effect of Sugarbeet Plant Populations on Yield, Quality and Recoverable Sucrose at Foxhome, MN in 2016

Treatment – Plants per 100 ft row	Mean root weight (lb)	Root yield (t/A)	Sucrose concentration(%)	Recoverable sucrose	
				(lb/t)	(lb/A)
50	3.3	20.8	16.0	294	6,098
100	2.3	27.5	17.0	319	8,741
150	1.6	29.3	17.2	324	9,485
175	1.4	29.3	17.3	325	9,499
200	1.3	29.7	17.0	320	9,461
250	1.1	30.3	17.4	327	9,897
300	1.0	31.0	16.9	316	9,773
LSD (P=0.05)	0.2	3.1	0.70	15.6	939