

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 97% 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 row) 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 2015. 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 16 April with SES 36918RR. Seeds were treated with Metlock Suite, Tach 20 and Kabina 14g. Seed spacing within the row was 2.4 inches and thinned to prescribed population at the 4 leaf stage. Rhizoctonia was controlled with a broadcast application of Quadris on 24 June. Weeds were controlled with two glyphosate applications on 4 and 24 June. Cercospora leaf spot was controlled with three fungicide applications on 16 July, 4 and 27 August.

Plots were defoliated mechanically and harvested using a mechanical harvester on 16 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

There were no significant differences in sucrose concentration, and recoverable sucrose per ton of beets among the different plant populations. However, the beet tonnage and the recoverable sucrose per acre at 50 beets per 100 feet of row (in 22" row) were significantly lower when compared to the higher populations. The lowest plant population (50 plants /100 ft) had significantly greater mean root weight than the higher populations. There was a trend of decreasing mean root weight as the population increased, except at the recommended population of 175 to 200 beets per 100 ft of row which had similar average weight. These results suggest that Roundup Ready sugarbeet produce similar root yields and recoverable sucrose when planted at a wide range of plant populations. At lower populations, significantly heavier roots are produced than at higher plant populations. Growers should strive to have at least 150 to 200 plants per 100 ft of row. An initial high population should be able to withstand some stand loss (25 to 50%) and have the capability of producing acceptable tonnage and recoverable sucrose, without the need for replanting.

Table 1. Effect of Sugarbeet Plant Populations on Yield, Quality and Recoverable Sucrose at Foxhome, MN in 2015

Treatment – Plants per 100 ft row	Mean root weight (lb)	Root yield (t/A)	Sucrose concentration(%)	Recoverable sucrose	
				(lb/t)	(lb/A)
50	4.1	25.4	14.7	264	6,703
100	2.7	30.8	15.6	281	8,628
150	2.1	31.2	16.1	296	9,226
175	1.8	30.4	15.4	279	8,460
200	1.9	32.4	15.4	281	9,096
250	1.5	30.3	15.3	277	8,390
300	1.4	31.3	15.5	284	8,910
LSD (P=0.05)	0.4	2.6	NS	NS	951