

OPTIMUM PLANT POPULATION OF RHIZOMANIA RESISTANT VARIETIES FOR HIGHEST RECOVERABLE SUCROSE

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Introduction and Objective

The optimum plant population for sugarbeet is 150 plants per 100 feet of 22 inch rows using conventional sugarbeet varieties. Since the confirmation of Rhizomania in southern Minnesota in 1996, significant acreages have been planted with Rhizomania resistant varieties. In 2003, approximately 80% of southern Minnesota sugarbeet acres were planted with Rhizomania resistant varieties which increased to 100% in 2004. It is anticipated that Rhizomania resistant varieties will also increase in the Red River Valley.

The objective of this research was to determine the optimum plant population that would result in the highest sugarbeet yield and quality using Rhizomania resistant varieties.

Materials and Methods

Research was conducted at Foxhome, MN. VDH 46177 (diploid) and Beta 4818 (triploid) sugarbeet seeds were planted with a John Deere MaxEmerge 2 planter into plots 11 feet wide and 30 feet long on April 26. Seeds were placed 1.25 inches deep and spaced 3 inches apart in rows that were 22 inches wide. Counter was applied at 11.9 lb/acre at planting to control sugarbeet root maggot. Treatments were manually thinned during the four to six leaf stages to obtain 100, 125, 150, 175, 200 and 225 plants per 100 feet of row. The experiment was a split plot design with four replicates. Fertilization was according to standard recommendations for sugarbeet. Plots were kept weed free using micro-rates of herbicides recommended for sugarbeet, hand-weeding, and cultivation. Fungicide was used to control Cercospora leaf spot.

The middle two rows of each plot were harvested on October 4. Yield was determined and quality analysis performed by American Crystal Sugar Company Quality Tare Laboratory, East Grand Forks, Minnesota. Data was analyzed for differences by analysis of variance and LSD using Agriculture Research Manager, version 6.0.

Summary of Results

In 2004 at Foxhome ([Table 1](#)) the 175 plants per 100 feet of row treatment resulted in the highest recoverable sucrose per acre for both VDH 46177 and Beta 4818. The average root weight for VDH 46177 at 175 plants per 100 feet of row was significantly lower than at 150 plants per 100 ft of row (current recommendation). However, the average root weight for Beta 4818 at 175 plants per 100 ft of row was not significantly lower than at 150 plants per 100 ft of row.

In 2003, at Foxhome ([Table 2](#)), VDH 46177 at 175 plants per 100 feet of row produced the highest recoverable sucrose per acre, ton and percent sucrose compared to the other treatments. However, VDH 46177 at 175 plants per 100 foot of row had a significantly lower average root weight compared to VDH 46177 at the recommended 150 plants per 100 feet of row.

The research data suggests that both VDH 46177 and Beta 4818 could be planted at 175 plants per 100 feet of row to optimize recoverable sucrose per acre without adversely impacting sugarbeet quality.

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Table 1. Effect of Plant Population on Sugarbeet Yield and Quality.

Treatment (Plants/ 100 ft row)	Recoverable Sucrose		Root yield	Sucrose	SLM*	Ave. root wgt.
	(lbs/A)	(lbs/T)	(tons/A)	(%)	(%)	(lbs)
VDH 46177						
100	7173 b	294 d	24.6 a	15.73 c	0.99 ab	1.75 ab
125	7753 ab	306 a-d	25.4 a	16.18 a-c	0.87 bc	1.71 ab
150	8225 a	312 a-d	26.5 a	16.40 a-c	0.80 c	1.59 abc
175	8342 a	321 a	26.2 a	16.85 a	0.85 bc	1.31 de
200	7849 ab	314 ab	25.2 a	16.57 a-c	0.88 bc	1.22 de
225	7550 ab	299 b-d	25.4 a	15.88 bc	0.96 ab	1.23 de
Beta 4818						
100	7798 ab	295 cd	26.5 a	15.84 bc	1.09 a	1.80 a
125	7737 ab	304 ab	25.5 a	16.18 a-c	0.98 ab	1.64 ab
150	8069 ab	312 a-d	26.0 a	16.51 a-c	0.90 bc	1.54 bc
175	8227 a	315 ab	26.3 a	16.63 ab	0.88 bc	1.41 cd
200	8030 ab	319 a	25.4 a	16.83 a	0.87 bc	1.12 de
225	7755 ab	314 ab	24.8 a	16.58 a-c	0.90 bc	1.18 e
LSD	930	19	3.1	0.89	0.15	0.23
CV	8	4	8.4	3.75	11.54	10.44

*Sugar loss to molasses.

Table 2. Effect of Plant Population on Sugarbeet Yield and Quality.

Treatment (Plants/100 ft row)	Recoverable Sucrose		Root yield (tons/A)	Sucrose (%)	SLM*	Ave. root wt. (lbs)
	lbs/A	lbs/ton				
100	5911 a	286 a	19.8 a	15.84 a	1.55 a	1.66 a
125	6473 a	295 a	21.3 a	16.11 a	1.38 ab	1.50 a
150	6372 a	301 a	20.4 a	16.43 a	1.40 ab	1.29 b
175	6493 a	301 a	20.8 a	16.53 a	1.45 ab	1.08 c
200	6088 a	291 a	20.3 a	15.93 a	1.38 ab	0.93 c
225	6054 a	302 a	19.4 a	16.44 a	1.30 b	0.97 c
LSD	968	23	2.6	1.00	0.22	0.20
CV	10.31	5.1	8.41	4.13	10.21	10.93

*Sugar loss to molasses.