PLANT POPULATION STUDIES 2001 – PLANT TO STAND

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INTRODUCTION AND OBJECTIVE

Sugarbeet breeders aim to produce stable, dependable varieties, which consistently give the highest possible yield of sugar per unit area in relation to production cost, and which meet various other specific requirements of the growers and sugar cooperatives. The selection for sugar yield, a product of root yield and sugar content, is a selection for greater physiological efficiency. It will be ideal to have varieties expressing simultaneously high root yield and high sugar content. It is difficult to obtain a variety high in root yield and sugar content because there is almost invariably a negative correlation between root yield and sugar content. Consequently, our varieties are considered to be high tonnage, high sugar, or normal that is intermediate in yield and sugar. The choice of the most suitable variety for a particular area is influenced by a number of factors, including nutrient status of soil, prevalent diseases, and payment system for the roots.

Our current recommendation for plant population is to have at harvest 35,640 uniformly spaced plants per acre for good yields of high quality sugarbeet. This means that there should be 150 plants per 100 linear row foot after thinning or at the six-leaf growth stage.

The objective of this research was to determine the seed spacing at planting of high tonnage and high sugar varieties that would result in a plant population at harvest that will produce the highest recoverable sugar per acre (RSA) and/or the highest recoverable sucrose per ton of sugarbeet (RST).

MATERIALS AND METHODS

Research was conducted at Fargo, ND, on a Fargo silty clay soil and at Breckenridge, MN, on a silty clay loam soil. The high sugar variety was Beta 6447 and the high tonnage variety was Seedex Thunder. At Fargo, planting was done on 16 May, and at Breckenridge, 14 May. Planting was done with a John Deere MaxEmerge 2 planter into plots 11 feet in width and 30 feet in length. Seeds were placed 1.25 inches deep and (as close as possible as the planter specifications will allow to) 4, 4.5, 5, 5.5, and 6 inches apart in rows that were 22 inches wide. Counter was applied at 11.9 lb/acre at planting to control sugarbeet root maggot. The experiment was arranged in a randomized complete block design with four replications. Fertilization was done according to standard recommendation for sugarbeet. Plots were kept weed free using micro-rates of herbicides recommended for sugarbeet, and cultivation. Eminent and Supertin were used for controlling Cercospora leaf spot.

The middle two rows of each 6-rows plot were counted and harvested at Fargo and Breckenridge on 17 and 19 September, respectively. 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

Yield, quality, and plant population results are presented in Tables 1 and 2. At Fargo (Table 1), there was no significant difference in recoverable sugar per acre (RSA) for the different plant spacing within each variety, except for VDH 66283 where the RSA at the 5.5" spacing was significantly lower than at the 4" and 4.5" spacing.
At Breckenridge (Table 2), there was a significant difference in RSA at different plant spacing only for Beta 2084 at the 4.5" where it was higher than the 4" and 6" spacing.

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Table 1. Effect of Seed Spacing At Planting On Sugarbeet Yield and Quality at Fargo, ND, 2001.

Treatment Variety – spacing (in)	June 19	Harvest	Recoverable Sucrose		Root Yield	Sucrose Content	LTM[2]
	Pl/acre	Pl/acre	(lb/A)	(lb/T)	(T/A)	(%)	(%)
Beta 6447 - 4	65873	46728	6679	330	20.6	17.5	0.9
Beta 6447 - 4.5	59762	42530	6593	324	20.8	17.2	0.9
Beta 6447 - 5	56111	42055	6869	322	21.8	17.1	1.0
Beta 6447 - 5.5	50079	34848	7006	327	21.9	17.3	0.9
Beta 6447 - 6	48809	35640	6209	324	19.5	17.2	1.0
Beta 2084 - 4	69444	46094	6195	315	19.9	16.8	1.0
Beta 2084 - 4.5	61468	41500	5987	324	18.8	17.2	1.0
Beta 2084 - 5	56230	41817	5910	310	19.3	16.6	1.0
Beta 2084 - 5.5	49682	36511	5943	311	19.6	16.6	1.0
Beta 2084 - 6	47261	31521	6017	318	19.3	16.9	1.0
Beta 3843 - 4	66984	39204	6125	313	19.8	16.7	1.0
Beta 3843 - 4.5	60515	38649	5733	314	18.5	16.8	1.0
Beta 3843 - 5	54563	34768	6058	310	20.0	16.6	1.1
Beta 3843 - 5.5	49405	33184	5781	321	18.4	17.1	1.0
Beta 3843 - 6	46745	33264	6571	316	21.2	16.9	1.0
Seedex Thunder - 4	67024	43639	6577	311	21.7	16.3	1.1
Seedex Thunder - 4.5	59444	41817	7067	324	22.4	17.2	1.0
Seedex Thunder - 5	54325	40154	6706	330	20.7	17.4	0.9
Seedex Thunder – 5.5	48452	38887	6096	320	19.4	17.0	1.0
Seedex Thunder - 6	44960	36669	6139	311	20.2	16.7	1.1
Croplan 101 - 4	64841	42134	5967	318	19.2	16.5	1.0
Croplan 101 – 4.5	59484	41421	6223	315	20.1	16.8	1.0
Croplan 101 - 5	52341	39441	6554	321	20.3	17.1	1.0
Croplan 101 – 5.5	48134	36907	6368	313	20.8	16.7	1.1
Croplan 101 - 6	44801	32630	6640	311	22.0	16.7	1.1
VDH 66283 - 4	85436	46648	6477	313	21.1	16.7	1.0
VDH 66283 – 4.5	63928	45698	6375	315	20.7	16.8	1.0
VDH 66283 - 5	56428	41976	5967	316	19.1	16.9	1.0
VDH 66283 – 5.5	52896	38174	5162	304	17.4	16.3	1.1
VDH 66283 - 6	47698	37461	5908	306	19.8	16.3	1.0
LSD (P=0.05) CV%	6445 9.1	5196 10.5	1041 13.3	15.1 3.8	3.5 13.9	0.7 3.2	0.1 7.8

[2]LTM: Sugar loss to molasses

Table 2. Effect of Seed Spacing At Planting On Sugarbeet Yield and Quality at Breckenridge, MN, 2001.

Treatment Variety – Spacing (in)	June 01	Harvest	Recoverable Sucrose		Root Yield	Sucrose Content	LTM[2]
	Pl/acre	Pl/acre	(lb/A)	(lb/T)	(T/A)	(%)	(%)
Beta 6447 - 4	60873	47757	9390	360	26.8	19.4	1.3
Beta 6447 - 4.5	56666	49104	8985	368	24.8	19.6	1.2
Beta 6447 - 5	50634	41025	9355	357	26.7	19.2	1.3
Beta 6447 - 5.5	44841	38412	8558	363	24.0	19.4	1.3
Beta 6447 - 6	41111	35481	9386	371	25.9	19.8	1.2
Beta 2084 - 4	57143	46252	8593	347	25.2	18.7	1.3
Beta 2084 - 4.5	59841	46252	10669	358	30.6	19.2	1.3
Beta 2084 - 5	51111	38412	9694	354	27.9	19.1	1.3
Beta 2084 - 5.5	41349	33580	8817	348	25.8	18.8	1.4
Beta 2084 - 6	44762	36669	5782	335	16.4	18.2	1.5
Beta 3843 - 4	56270	40471	8793	364	24.6	19.5	1.3
Beta 3843 - 4.5	47778	39837	8786	367	24.3	19.7	1.3
Beta 3843 - 5	45238	33264	8951	369	24.9	19.7	1.2
Beta 3843 - 5.5	43095	34848	9388	370	25.8	19.7	1.2
Beta 3843 - 6	38888	29620	9636	357	27.6	19.1	1.2
Seedex Thunder - 4	55873	45064	9492	369	26.3	19.7	1.3
Seedex Thunder - 4.5	56984	45460	9272	357	26.7	19.2	1.3
Seedex Thunder - 5	48730	40550	8688	368	24.0	19.7	1.2
Seedex Thunder - 5.5	43889	36669	9599	350	28.2	18.9	1.3
Seedex Thunder - 6	40396	38253	9095	361	25.7	19.3	1.2
Croplan 101 - 4	62381	43084	9355	379	25.2	20.1	1.2
Croplan 101 - 4.5	54841	36115	9436	368	26.3	19.6	1.2
Croplan 101 - 5	48889	37303	8826	360	25.1	19.4	1.3
Croplan 101 - 5.5	46031	33580	9889	374	27.1	19.9	1.2
Croplan 101 - 6	44206	31204	9314	355	26.8	19.1	1.3
VDH 66283 - 4	65714	54331	9474	374	26.1	19.9	1.2
VDH 66283 - 4.5	61190	46490	9202	367	25.8	19.7	1.3
VDH 66283 - 5	58333	48708	7430	374	19.4	19.9	1.2
VDH 66283 - 5.5	49920	41817	9668	364	27.7	19.5	1.3
VDH 66283 - 6	48889	46332	8910	369	24.8	19.6	1.2
LSD (P=0.05)	7417	6253	1998	20	6.4	0.9	0.2
CV%	11.6	12.3	17.6	4.5	19.9	3.6	11.8

[2]LTM: Sugar loss to molasses