

**PLANT POPULATION AND DATE OF PLANTING EFFECTS WITH RHIZOMANIA
RESISTANCE AND SUSCEPTIBLE VARIETIES ON SUGARBEET YIELD AND QUALITY
Year - 2**

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Sugarbeet yield and quality with some rhizomania resistant varieties is lower than that of comparable susceptible varieties making growers reluctant to use them. This trial was designed to determine if increasing the plant population of a rhizomania resistant variety would increase overall quality, as well as yield, compared to a susceptible check under a non-rhizomania environment. A similar trial at a known rhizomania location is being conducted by Dr. Joseph Giles, North Dakota State University.

Procedure: Hilleshog 2469 (resistant) and Beta 3820 (susceptible) sugarbeet seed were planted in 22-inch rows at a 1.25 inch spacing to insure adequate thinning populations on April 29 and May 27, 2004. The varieties were chosen for their similarity in yield, but wide differences in net sucrose % and recoverable sugar per ton (RST).

Both planting dates were thinned to populations of 17820, 23760, 29700, 35640, 41580, 47520, and 53460 seedlings per acre at the six-leaf stage. These populations correspond to plant populations of 75, 100, 125, 150, 175, 200, and 225 plants per 100 ft of 22-inch row. Recommended fertility, herbicide, insecticide and fungicide practices were followed. The trial was harvested on September 28 and quality determined at the ACSC Quality Laboratory in East Grand Forks, MN.

Results and Discussion: Planting date (PD) and population (P) effects were statistically significant for the variable recoverable sugar/acre (RSA), recoverable sugar/ton (RST), percent sucrose, percent loss to molasses (LTM) and gross return/acre ([Table 1](#)). Varieties (V) showed similar results, with the exception of yield having non-significant effects. A PD x V interaction was significant for yield. This resulted from Hilleshog 2469 having the highest yield at the first planting, averaged over populations, and the lowest yield at the second planting date as compared to Beta 3820. There were no other significant interactions.

The main effects of PD, V and P are shown in [tables 2-4](#). The 41580 plant/acre population produced significantly higher RSA than did the four lower populations and the highest population in the trial. In general, there was a linear increase in the variables measured up to this population, although not statistically significant in all cases.

Analysis of the individual varieties at each planting date is shown in [Tables 5-8](#). The April 29 planting for Beta 3820 showed nonsignificant differences between populations of 29,700 - 53,460 plants/a for RSA, RST, % sucrose, LTM or gross return/a. Yield was significantly higher at the 41580 and 47520 plants/A populations than the 29,700 population. On the May 27 planting the 41580 plant population also had higher RSA and yield than did the 29,700 population.

The April planting of Hilleshog 2469 showed nonsignificant differences in the variables measured between populations of 29,700 - 53,460. At the May planting populations greater than 29,700 plants/a were needed to maximize RSA and yield. The Hilleshog variety showed the largest decline between the two planting dates.

Summary: The results of the 2004 trial mirror the results obtained in 2003. The 2003 trial compared the varieties Crystal 999 (susceptible) and Beta 4811 (rhizomania resistant). While overall quality and yield were improved by increasing plant population, both varieties, with the exception of yield, performed in a similar fashion. An improvement in quality of the rhizomania resistant variety as compared to the susceptible check failed to occur under a non-rhizomania situation.

Table 1. ANOVA

Source	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
Planting Date (PD)	**	*	**	*	*	**
Variety (V)	*	**	NS	**	NS	**
PD x V	NS	NS	**	NS	NS	NS
Population (P)	**	**	**	**	**	**
PD x P	NS	NS	NS	NS	NS	NS
V x PD	NS	NS	NS	NS	NS	NS
PD x V x P	NS	NS	NS	NS	NS	NS

** , * , Statistically significant at the 1 and 5% levels respectively

Table 2. Main planting date effects (ave over V and P) on yield and quality.

Planting Date	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
April 29	6888	296.5	23.2	15.85	1.02	742*
May 27	5922	286.7	20.6	15.41	1.08	617

* Basis ACSC November 20004 payment

Table 3. Main varietal effects (ave over P and PD) on yield and quality.

Variety	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
Beta 3820	6535	297.5	21.9	15.91	1.03	709
Hilleshog 2469	6275	285.6	21.9	15.35	1.07	650

Table 4. Main population effects (ave over V and PD) on yield and quality

Population	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
17820 (75)	5031	272.5	18.4	14.81	1.18	492
23760 (100)	5875	285.6	20.5	15.37	1.09	608
29700 (125)	6509	294.0	22.1	15.72	1.02	695
35640 (150)	6733	293.8	22.9	15.72	1.02	718
41580 (175)	7083	298.0	23.8	15.90	1.00	767
47520 (200)	6908	298.2	23.1	15.93	1.02	749
53460 (225)	6698	299.0	22.4	15.96	1.00	728
LSD ₀₅	329	9.4	1.1	0.44	0.08	54

Table 5. Effect of planting date (April 29) and population on Beta 3820

Population (plants /A)	RSA (lb)	RST (lb)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
17820 (75)	5568	283.7	19.6	15.35	1.17	570
23760 (100)	6358	298.2	21.3	15.94	1.03	689
29700 (125)	7162	312.7	22.9	16.53	0.90	813
35640 (150)	7433	310.7	23.9	16.50	0.97	839
41580 (175)	7522	308.3	24.4	16.35	0.93	843
47520 (200)	7363	304.0	24.2	16.23	1.03	813
53460 (225)	7094	308.1	23.0	16.44	1.03	794
LSD ₀₅	492	9.7	1.3	0.54	0.15	72

Table 6. Effect of planting date (May 27) and population on Beta 3820

Population (Plants/A)	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
17820 (75)	4530	260.7	17.4	14.33	1.30	417
23760 (100)	5458	278.4	19.6	15.09	1.17	548
29700 (125)	6284	293.3	21.4	15.70	1.03	668
35640 (150)	6339	298.0	21.3	15.90	1.00	686
41580 (175)	7147	302.0	23.6	16.07	0.97	785
47520 (200)	6816	305.3	22.4	16.20	0.93	755
53460 (225)	6422	301.9	21.3	16.10	1.00	704
LSD ₀₅	801	24.1	1.9	1.06	0.20	131

Table 7. Effect of Planting Date (April 29) on Hillehog 2469.

Population (Plants/A)	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
17820 (75)	5599	281.3	1.99	15.13	1.07	568
23760 (100)	6525	287.3	22.7	15.43	1.07	679
29700 (125)	6958	289.3	24.0	15.57	1.10	729
35640 (150)	7148	284.0	25.2	15.27	1.07	733
41580 (175)	7147	286.3	25.0	15.32	1.00	741
47520 (200)	7314	296.9	24.6	15.85	1.00	789
53460 (225)	7242	300.0	24.2	15.97	0.97	788
LSD ₀₅	747	14.6	1.9	0.66	----	111

Table 8. Effect of Planting Date (May 27) on Hillehog 2469.

Population (Plants/A)	RSA (lb/A)	RST (lb/T)	Yield (T/A)	Sucrose (%)	LTM (%)	Gross Return (\$/A)
17820 (75)	4427	264.3	16.8	14.42	1.20	414
23760 (100)	5158	278.5	18.5	15.02	1.10	518
29700 (125)	5632	280.5	20.1	15.09	1.07	569
35640 (150)	6013	282.7	21.3	15.20	1.07	614
41580 (175)	6514	295.1	22.1	15.86	1.10	698
47520 (200)	6138	286.7	21.4	15.44	1.10	637
53460 (225)	6033	286.0	21.1	15.33	1.03	624
LSD ₀₅	769	27.9	1.4	1.27	----	142