

EFFECT OF PLANTING DATE AND POPULATION ON SUGARBEET YIELD AND QUALITY

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Introduction

In the effort to improve beet yield and quality in Michigan, planting date as well as the populations at those dates has become an important topic. The decision to risk planting early as well as the decision to replant a lower population field is a major concern through the first few weeks of the growing season. Three trials have been conducted testing multiple dates of planting, as well as various populations on those dates. The goal of these trials was to better understand the benefits or drawbacks from an early planting, as well as determining if certain populations at earlier dates can perform better than higher populations at later dates.

Objectives:

The trials conducted in 2008, 2009, and 2012 were to help determine the potential benefit for an earlier planting date, as well as to determine how yield is effected by populations at those different dates. In 2008 and 2009 four planting dates were compared with 7 different populations. These dates began in early April and other plantings followed at 2 week intervals ending un early June. In 2012 5 planting dates were established with 5 different populations. These dates began in late March and followed at one week intervals into mid-April. The 2012 trial began at a much earlier date because of the early spring in Michigan. Many of our trials as well as most of the Co-op grower's fields were planted in late March or early April.

Methods and Materials:

In 2008, one trial was conducted comparing 4 planting dates. These dates were April 18, May 6, May 25, and June 13. Also for each of these dates, 7 populations were tested. Those populations were 50, 65, 80, 100, 125, 150, and 175 beets/100ft of row. This trial was a small plot replicated trial with each plot being 6 rows wide and 35 ft long replicated 6 times. In 2008, this trial was planted in 30" row spacing prior to the change to 22" rows for research in 2009. This trial was planted at a high population and then thinned at the 4 leaf stage to the respective amount of beets/100ft of row. All treatments received a foliar banded application of fungicide for rhizoctonia control just after being thinned, as well as fungicide and glyphosate applications throughout the growing season. The center 4 rows of each 6 row plot were harvested for data comparison.

In 2009, one trial was conducted comparing 4 planting dates. These dates were April 25, May 11, May 26, and June 10. Also for each of these dates, 7 populations were tested. Those populations were 50, 65, 80, 100, 125, 150, and 175 beets/100ft of row. This trial was a small plot replicated trial with each plot being 6 rows wide and 38 feet long with 6 replications. This trial in 2009 was conducted on 22" row spacing. The trial was planted at a high population and then thinned at the four leaf stage to the respective amount of beets/100ft of row. All treatments received a foliar banded fungicide application for rhizoctonia control just after thinning, as well

as glyphosate and fungicide applications throughout the growing season. The center 4 rows of each 6 row plot were harvested for data comparison.

In 2012, one trial was conducted comparing 5 planting dates. These dates were March 22, March 29, April 5, April 13, and April 21. Also for each of these dates, 5 populations were tested. Those populations were 50, 75, 100, 150, and 200 beets/100ft of row. This trial was a small plot replicated trial with each plot being 6 rows wide and 38 feet long with 6 replications. This trial in 2012 was conducted on 22" row spacing. The trial was planted at a high population and then thinned at the four leaf stage to the respective amount of beets/100ft of row. All treatments received a T-band application of fungicide at planting for rhizoctonia control. Also, all treatments received a foliar banded fungicide application for rhizoctonia control just after thinning, as well as glyphosate and fungicide applications throughout the growing season. The center 4 rows of each 6 row plot were harvested for data comparison.

Results

In 2008, when populations were averaged, beets planted at the first planting date had an increased yield of .58-2.92 tons/acre. In general, yields increased as populations increased for each planting date. A population of 80 beets/100ft of row at the first planting date yielded significantly higher than the highest populations at later dates.

2008 Data

Compare Planting Dates						
1	1st Planting	7058	245.2	28.75	17.08	93.58
2	2nd Planting	5957	231.0	25.73	16.50	92.78
3	3rd Planting	4564	215.4	21.16	15.69	92.14
4	4th Planting	2687	186.3	14.35	14.16	90.77
LSD 5%		320.0	10.6	0.71	0.63	0.62
CV		14.5	10.9	7.15	8.86	1.54
Grand Mean		5066.5	219.5	22.50	15.86	92.32
ID #	Treatment	RWSA	RWST	Tons/A	% Suc	% Purity
Compare Sugarbeet Populations						
7	175 Beets/100 Ft	5718	230.8	24.17	16.33	93.14
6	150 Beets/100 Ft	5618	231.5	23.76	16.53	92.74
5	125 Beets/100 Ft	5511	228.2	23.66	16.34	92.66
4	100 Beets/100 Ft	5110	218.0	22.78	15.93	91.87
3	80 Beets/100 Ft	4854	218.0	21.68	15.79	92.29
2	65 Beets/100 Ft	4454	203.1	21.65	14.87	91.74
1	50 Beets/100 Ft	4201	206.8	19.78	15.20	91.78
LSD 5%		423.3	14.0	0.94	0.83	0.82
CV		14.5	10.9	7.15	8.86	1.54
Grand Mean		5066.5	219.5	22.50	15.86	92.32

In 2009, when populations were averaged, the first planting date had a significantly higher RWST as well as sugar content compared to later planting dates. Yield tended to increase with earlier planting dates and population, but the amounts were not always significant. A

population of 100 beets/100ft of row planted on the first planting date was significantly better than higher populations planted at later dates.

2009 Data

Trt	Planting Date	RWSA	RWST	Tons/A	% Suc	% CJP
1	April 25th	4312	237.7	17.971	16.505	94.037
2	May 11th	4091	231.6	17.553	16.18	93.79
3	May 26th	3430	222.4	15.349	15.739	93.354
4	June 10th	2666	196.8	13.28	14.356	92.332
LSD 5%		225.9	5.4	0.87	0.29	0.25
CV %		15.8	5.8	14.2	4.6	0.7
Mean		3624.7	222.1	16.04	15.69	93.38

Effect of Sugarbeet Population						
Trt No.	Beets Per 100'	RWSA	RWST	Tons/A	% Suc	% CJP
1	175 beets per 100'	4282	232.1	18.33	16.28	93.6
3	125 beets per 100'	4190	231.5	17.84	16.18	93.8
2	150 beets per 100'	3974	234.4	16.81	16.31	94.0
4	100 beets per 100'	3682	221.3	16.52	15.70	93.2
6	65 beets per 100'	3631	218.7	16.20	15.38	93.7
5	80 beets per 100'	3451	218.3	15.42	15.57	93.0
7	50 beets per 100'	3252	208.7	15.04	14.90	93.0
LSD 5%		357	8.6	1.37	0.47	0.4
CV %		15.8	5.8	14.2	4.6	0.7
Mean		3780	223.6	16.60	15.76	93.5

In 2012, when populations were averaged, the first planting date yielded a significant amount of 2.1-5.6 tons/acre better than the other planting dates. The first planting date also produced a significant amount more sugar per acre, 630-1,518 pounds. A population of 150 beets/100ft of row was as good as or significantly better than higher populations planted at later dates. This trial was planted much earlier than the other two trials, and the dates between plantings were much closer. There is not nearly as much separation between each of the planting dates or populations, but the trend is that earlier dates and higher populations yield much higher. Canopy closure was significantly higher and faster with the earliest planting dates and highest populations. This helps the plants to absorb the most sunlight, as well as help in the reduction of weed pressure.

2012 Data

Effect of Planting Date on Sugarbeet Yield and Quality									
Averaged Over all Beet Populations									
Planting Date	\$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Emerg	% Canopy Close	
								Jun	Aug
Mar 22	1917	8112	265	30.6	18.0	94.9	65.7	62	93
Mar 29	1768	7482	262	28.5	17.8	94.8	76.9	49	92
Apr 5	1752	7411	264	28.0	17.9	94.8	72.6	46	90
Apr 13	1654	6996	264	26.4	18.0	94.8	65.4	44	88
Apr 21	1559	6594	263	25.0	17.9	94.7	69.7	39	87
Average	1730	7319	264	27.7	17.9	94.8	70.1	48	90
LSD 5%	62.9	266.1	ns(3.8)	1.0	ns(0.2)	ns(0.3)	3.2	4.0	2.9

Effect of Population on Sugarbeet Yield and Quality									
Averaged Over all Planting Dates									
Beets/100'		\$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Canopy Close	
Plan	Actual							Jun	Aug
200	203	1948	8240	271	30.4	18.2	95.3	50.8	91.6
150	153	1911	8084	270	29.9	18.2	95.2	48.9	91.2
100	102	1800	7613	265	28.7	18.0	94.8	46.4	90.5
75	77	1627	6885	259	26.5	17.7	94.5	46.5	88.6
50	53	1365	5773	252	22.9	17.4	94.1	45.4	89.1
Average	65	1496	6329	256	24.7	17.6	94.3	46.0	88.9
LSD 5%	3.0	64.5	273.0	3.4	0.9	0.2	0.3	2.2	2.0

All Dates and Populations									
Planted		Beets/100'		\$/A	RWSA	RWST	T/A	% Sugar	% CJP
		Planned	Actual						
1st	Mar 22	200	200	2158	9129	276	33.1	18.5	95.4
1st	Mar 22	150	148	2122	8979	272	33.1	18.2	95.6
2nd	Mar 29	150	154	2050	8675	272	31.8	18.3	95.2
1st	Mar 22	100	101	2001	8464	267	31.7	18.0	95.0
3rd	Apr 5	200	206	2000	8460	270	31.4	18.1	95.3
2nd	Mar 29	200	198	1968	8326	269	31.0	18.1	95.0
3rd	Apr 5	150	154	1925	8146	271	30.1	18.2	95.3
4th	Apr 13	200	206	1846	7811	273	28.6	18.3	95.3
4th	Apr 13	100	103	1817	7686	267	28.8	18.1	94.8
3rd	Apr 5	100	100	1794	7592	264	28.7	18.0	94.8
5th	Apr 21	200	205	1766	7473	270	27.8	18.1	95.3
1st	Mar 22	75	76	1752	7413	258	28.8	17.7	94.2
4th	Apr 13	150	156	1730	7317	268	27.3	18.1	95.1
5th	Apr 21	150	154	1726	7302	269	27.2	18.2	95.0
2nd	Mar 29	100	102	1721	7282	261	27.9	17.7	94.8
2nd	Mar 29	75	77	1696	7177	259	27.7	17.6	94.8
5th	Apr 21	100	103	1664	7042	268	26.3	18.2	94.8
4th	Apr 13	75	76	1657	7008	262	26.7	17.9	94.7
3rd	Apr 5	75	78	1559	6597	263	25.1	18.0	94.5
1st	Mar 22	50	50	1554	6575	251	26.1	17.3	94.2
3rd	Apr 5	50	52	1480	6261	253	24.8	17.4	94.2
5th	Apr 21	75	78	1473	6231	256	24.4	17.5	94.5
2nd	Mar 29	50	52	1406	5950	249	23.8	17.3	94.1
4th	Apr 13	50	59	1219	5156	251	20.5	17.4	94.1
5th	Apr 21	50	52	1164	4923	255	19.3	17.6	94.1
Average			118	1730	7319	264	27.7	17.9	94.8
LSD 5%			6.6	144.3	610.5	7.6	2.1	0.4	0.6
CV %			4.9	7.3	7.3	2.5	6.6	1.9	0.6

Bold: Results are not statistically different from top-ranking treatment in each column.

\$/A: Gross payment unless noted as net.

Conclusion

Based on three years of testing, we can determine that planting at earlier dates will produce a significantly better sugarbeet crop. Higher populations at those earlier dates will yield significantly higher than lower populations. Also, populations around 100 beets/100ft of row planted at earlier plating dates can often outperform higher populations planted at later dates. When trying to decide to replant, a grower must realize this before they risk the uncertainty of replanting with no guarantee of a higher population. Future trials will be performed to help produce planting date and replant guidelines for the Michigan Sugar Company Cooperative.