

EFFECT OF STARTER FERTILIZER ON SUGAR PRODUCTION

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Starter fertilizer is used to help get the sugarbeet off to a fast vigorous growth in the Red River Valley of Minnesota and North Dakota. The last several years there has been much interest in applying starter fertilizer, especially higher rates of phosphate at planting, especially in cool, wet springs. This experiment was designed to compare the effectiveness of several different starter fertilizer products, rates, and application methods to increase sugar production.

Materials and Methods

Field experiment was established on Glyndon loam (Coarse-silty, mixed, superactive, frigid Aeric Calciaquoll) at the Rhizomania research site near Glyndon, MN. Treatments were arranged in a randomized split block design with six replications. Soil nitrogen levels were adjusted with fertilizer to 130 lbs/acre of available residual soil test plus added fertilizer N. Individual treatment plots measured 11 feet wide and 30 feet long. Treatments consisted of two sugarbeet varieties, 3 gals 10-34-0 per acre banded in furrow at planting with no additional P fertilizer added: 60 lbs P₂O₅ per acre as 0-44-0 broadcast and incorporated prior to planting with no additional P fertilizer added: and 3 gals 10-34-0 per acre banded in-furrow at planting plus 60 lbs P₂O₅ per acre as 0-44-0 broadcast and incorporated prior to planting: 2.5 gals per acre RiserR (7-17-3 with trace amounts of copper, iron, manganese and zinc) banded in furrow at planting: 3 gals 10-34-0 with 32 ounce ACA Plus (7-0-0) per acre banded in furrow at planting: 2 qts per acre Awaken (16-0-2 with trace amounts of boron, copper, iron, manganese, molybdenum, zinc and chlorine) banded in furrow at planting: 3pts Awaken with 0.25% v/v Liberate (penetrant deposition aid drift control agent) per acre foliar applied at 4-6 leaf stage: and untreated check. Variety was the main block.

Sugarbeet, Hilleshog 2469 and Vanderhave 46177 (rhizomania resistant varieties), was planted on May 03, 2004 with a John Deere MaxEmerge 2. Sugarbeet was placed 1.25 inches deep with 2 1/2-inch in-row spacing. A 22-inch row spacing was used. Counter was surface band applied at 11.9 lbs/a and incorporated with chain at planting. Post emergence micro-rate herbicides, cultivation and hand labor was used as needed for weed control. Three fungicide applications, Eminent, Headline and Eminent were applied for Cercospora leafspot control. Stand counts were taken prior to thinning to determine the affect of starter on germination and emergence. The stand was thinned to 150 beets per 100 feet of row at the 2 to 4 leaf stage of growth.

Sugarbeet were harvested October 5, 2004. The middle two rows of each 6 row plot were harvested. Yield determinations were made and quality analysis performed at American Crystal Sugar Quality Tare Lab, East Grand Forks, MN.

Results and Discussion

Early sugarbeet emergence and plant population was significantly different between the HH 2469 and VDH 46177 (Table 1). Counts were taken as soon as emergence was complete. Plant vigor, not the application of starter fertilizer would seem to be the reason for the large difference in early stand establishment of the two varieties. With the wet, cool soil temperatures following planting, an increase in plant vigor and significant yield response due to the application of starter fertilizer would be expected.

The application of starter fertilizer resulted in a significant increase in sugar production with several of the treatments over the untreated check (Table 2). The treatments using 10-34-0 alone or in combination with ACA and 10-34-0 + 60 lbs broadcast phosphorous and 60 lbs broadcast of phosphorous alone provided the highest yields, recoverable sugar per acre, and gross \$ return per acre, across both varieties. A slight decrease in harvested beets per 100 feet of row was also evident in the 10-34-0 treatments with both varieties. The Awaken treatments were greater than the untreated check but somewhat lower in yield and recoverable sugar per acre than the other treatments. Awaken @ 3 pint /a + liberate @ 0.25% post applied at the 4-6 leaf stage treatment, was lower in yield, recoverable sugar per acre, and gross \$ return per acre than the untreated check treatment with VDH 46177, due to the delay of availability of nutrients.

As a result of the cool, wet climatic conditions of 2004, use of phosphorus starter fertilizers in-furrow or broadcast and incorporated, dramatically improved sugar production over the untreated check treatment. However it has also been shown under certain conditions and years, there is no advantage to using a starter fertilizer or benefit may be minimal. This is only one year of data comparing the effectiveness of using starter fertilizer on two rhizomania varieties.

Table 1. Effect of starter fertilizer on early emergence of HH 2469, and VDH 46177, Rhizomania Site. Glyndon, MN. 2004.

Treatment	Plants per 100 feet of row	
	VDH 46177	HH 2469
Check	340	457
10-34-0 @ 3 g/a	297	463
RiserR 7-17-3 @ 2.5 g/a	359	488
10-34-0 @ 3 g/a +ACA Plus @ 32 oz	312	433
Awaken @ 2 qt/a	369	452
Awaken @ 3pt/a + Liberate @ 0.25%	301	482
10-34-0 @ 3 g/a + Brdcast P @ 60 lb/a	301	434
Brdcast P @ 60 lb/a	335	465
LSD (.05)	29	29
<u>Mean</u>	<u>369</u>	<u>459</u>

Table 2. Effect of Starter Fertilizer on HH 2469, and VDH 46177 on sugarbeet root yields, sucrose percentage, recoverable sugar production, harvest population and gross \$ return. Rhizomania Site. Glyndon, MN. 2004.

TREATMENT	ROOT YIELD Tons/A	NET SUCROSE Percent	REC SUGAR Lbs/Acre	REC SUGAR Lbs/T	HARVEST BEETS /100 FT	GROSS RETURN \$/T	GROSS RETURN \$/A
<u>HH 2469</u>							
Check	17.5	14.9	5222	292	146	32.62	573
10-34-0 @ 3 g/a	19.9	14.3	5676	281	150	30.00	594
RiserR 7-17-3 @ 2.5 g/a	19.5	14.8	5762	290	152	32.13	627
10-34-0 @ 3 g/a +ACA Plus @ 32 oz	21.1	14.7	6175	288	143	31.58	665
Awaken @ 2 qt/a	18.4	14.7	5411	288	153	31.75	585
Awaken @ 3pt/a + Liberate @ 0.25%	18.6	14.8	5520	291	157	32.25	601
10-34-0 @ 3 g/a + Brdcast P @ 60 lb/a	21.5	14.9	6408	292	144	32.54	702
Brdcast P @ 60 lb/a	22.0	14.5	6353	284	160	30.66	674
LSD (.05)	2.9	0.4	855	8	11	1.71	97
<u>VDH 46177</u>							
Check	16.2	15.5	5044	309	139	35.22	577
10-34-0 @ 3 g/a	18.2	15.4	5620	307	129	34.78	638
RiserR 7-17-3 @ 2.5 g/a	17.0	15.5	5271	310	148	35.26	601
10-34-0 @ 3 g/a +ACA Plus @ 32 oz	20.0	15.8	6346	317	135	36.82	739
Awaken @ 2 qt/a	16.9	15.7	5304	314	149	36.17	613
Awaken @ 3pt/a + Liberate @ 0.25%	13.9	15.5	4300	309	146	35.21	489
10-34-0 @ 3 g/a + Brdcast P @ 60 lb/a	20.9	15.5	6485	311	127	35.49	741
Brdcast P @ 60 lb/a	18.5	15.5	5736	309	152	35.22	653
LSD (.05)	2.4	0.4	840	8.8	9	NS	107
<u>Mean</u>							
Check	16.9	15.2	5133	304	136	33.92	575
10-34-0 @ 3 g/a	19.0	14.8	5648	297	133	32.39	616
RiserR 7-17-3 @ 2.5 g/a	18.2	15.1	5516	303	144	33.70	614
10-34-0 @ 3 g/a +ACA Plus @ 32 oz	20.5	15.2	6261	305	133	34.20	702
Awaken @ 2 qt/a	17.6	15.2	5358	304	145	33.96	599
Awaken @ 3pt/a + Liberate @ 0.25%	16.3	15.1	4910	303	145	33.73	545
10-34-0 @ 3 g/a + Brdcast P @ 60 lb/a	21.2	15.2	6446	304	129	34.02	721
Brdcast P @ 60 lb/a	20.3	15.0	6044	299	150	32.94	663
LSD (.05)	1.7	0.3	524	5.8	7.1	1.3	63

