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COMPARISION OF LIQUID AND DRY FERTILIZER STARTER MATERIAL FOR SUGARBEET PRODUCTION

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Introduction

The application of liquid fertilizer starter material, 10-34-0, even on medium phosphorus testing soil, has resulted in an increase in recoverab sugar during most years for sugarbeet growers in the Red River Valley of North Dakota and Minnesota. Past research has shown significant yield responses to starter fertilizer occur about 40% of the time, in particular in early plantings during cool springs. Early season vigor was enhanced about 2/3 of the time. The application of dry fertilizer material containing nitrogen and phosphorus in-furrow at planting time usin John Deere MaxEmerge 2 planter was evaluated in 2001 but repeated and expanded to two locations in 2002. The objective of this research was to compare the response of two dry fertilizer materials to that obtained using liquid starter. The dry materials were to be applied at rates equal to the amount of nitrogen and phosphorus contained in the recommended rate for 10-34-0 of 3 gallons per acre.

Materials and Methods

Field experiments were established on Bearden silty clay loam (Fine-silty, mixed, super active, frigid, Aeric Calciaquoll) on the Kirk Watt farm and the Dale Fischer farm near Glyndon, MN during the spring of 2002. The experiment was arranged in a randomized complete block design with six and four replications at the Watt and Fischer locations, respectively. Individual treatment plots measured 11 feet wide and 3(feet long. Soil nitrogen levels were adjusted with fertilizer to approximately 130 lbs/acre of available residual soil test plus added fertilizer N The Olsen soil phosphorus level was in the medium and low range at the Watt and Fischer locations, respectively. Dry fertilizer materials, 1(50-0, 18-46-0 and liquid material, 10-34-0 were applied between the double disk openers in the seed in-furrow at planting time. Gandy granular applicators were mounted on the planter to meter the dry material and a CO_2 pressurized system was used to apply the liquid mater The 10-50-0 was applied at 23.5 and 34.5 lbs/acre and the 18-46-0 at 25.5 and 19.4 lbs/acre to supply 11.7 and 3.5 lbs/acre of phosphorus an nitrogen, respectively. The accompanying amounts of nitrogen and phosphorus for each of these rates are given in Table1and 2.

Sugarbeet, Crystal 817, was planted May 1 with a John Deere MaxEmerge 2 at a ground speed of 4 MPH. Sugarbeet was placed 1.25 inches deep with 5 1/8 inch in-row spacing at the Watt location and a 3.5 inch spacing at Fischer's. A 22-inch row spacing was used. Counter was surfaced band applied at 11.9 lbs/a and incorporated with chain at planting. The sugarbeet stand at the Fischer location was hand thinned to a population of 150 plants /100 feet of row at the four leaf stage. Post emergence herbicides, cultivation and hand labor was used as needed fo weed control. Two applications each of Eminent and Super Tin were applied for Cercospora leafspot control.

Sugarbeet were harvested September 26. 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

With the application of liquid fertilizer in the seed furrow, a constant stream flow allows a uniform spread of the nutrients, however with granular fertilizer in the seed furrow, the potential for direct contact between a sugarbeet seed and a fertilizer granule is increased, which cou result in seed damage and decreased sugarbeet stand establishment. Sugarbeet response to the application of dry starter fertilizer was consist at both locations (Table1and 2). Dry fertilizer application was equally as good or better than liquid fertilizer with respect to recoverable suga production. The highest root and recoverable sugar yield resulted from the application of the application of 10-50-0 at the highest phosphoru rate at both locations, with the increase significant at the Fischer location. In both locations, this increase was not significantly different from the liquid fertilizer application response. The increased harvest sugarbeet population at the Fischer location because of the hand thinned stan establishment produced a greater yield response than the planted to stand population at the other location, even though the initial soil phosphorus test was lower. These results are consistent with those obtained in 2001 at the Watt location.

Table 1. Effect of starter fertilizer source on root yields, sucrose percentage, sucrose loss to molasses, recoverable sugar production, and harvest population (September 26), Kirk Watt, Glyndon, MN, 2002.

		LOSS TO	RECOVERABLE	HARVEST

FERTILIZER SOURCE	N Lbs/A	P_2O_5 Lbs/A	ROOT YIELD Tons/A	SUCROSE Percent	MOLASSES Percent	SUGAR Lbs/Acre	BEETS /100 FT
Check	0	0	18.8	16.74	2.21	5466	125
10-34-0	3.5	11.7	18.8	17.03	2.17	5579	106
10-50-0	2.4	11.7	19.4	16.99	2.23	5731	115
10-50-0	3.5	17.2	20.2	16.85	2.16	5924	114
18-46-0	4.6	11.7	19.7	16.61	2.26	5669	127
18-46-0	3.5	8.9	19.2	16.69	2.21	5557	99
LSD (.05)			ns	ns	ns	ns	20

Table 2. Effect of starter fertilizer source on root yields, sucrose percentage, sucrose loss to molasses, recoverable sugar production, and harvest population (September 25), Dale Fisher, Glyndon, MN, 2002.

FERTILIZER SOURCE	N Lbs/A	P_2O_5 Lbs/A	ROOT YIELD Tons/A	SUCROSE Percent	LOSS TO MOLASSES Percent	RECOVERABLE SUGAR Lbs/Acre	HARVEST BEETS /100 FT
Check	0	0	23.3	18.23	1.31	7892	140
10-34-0	3.5	11.7	25.3	18.32	1.44	8518	142
10-50-0	2.4	11.7	24.7	17.93	1.39	8160	146
10-50-0	3.5	17.2	26.0	18.72	1.44	8994	137
18-46-0	4.6	11.7	23.3	18.37	1.37	7893	145
18-46-0	3.5	8.9	23.6	18.52	1.41	8070	138
LSD (.05)			2.7	ns	ns	904	20