APPLICATION OF DRY FERTILIZER STARTER MATERIAL FOR SUGARBEET PRODUCTION-2001

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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 recoverable 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 using a John Deere MaxEmerge 2 planter has not been evaluated. 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 at Glyndon, MN and on Fargo silty clay (Fine, smectic, frigid, Typic Epiaquert) north of the airport at Fargo, ND, during the spring of 2001. The experiment was arranged in a randomized complete block design with six replications. Individual treatment plots measured 11 feet wide and 30 feet long at both locations. Soil nitrogen levels were adjusted with fertilizer to approximately 120 lbs/acre of available residual soil test plus added fertilizer N. The Olsen soil phosphorus level was in the medium range at both locations. Dry fertilizer materials, 10-50-0, 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 material. The 10-50-0 was applied at 22.4 and 33.0 lbs/acre and the 18-46-0 at 24.3 and 18.3 lbs/acre to supply 11.2 and 3.3 lbs/acre of phosphorus and nitrogen, respectively. The accompanying amounts of nitrogen and phosphorus for each of these rates are given in Table 1 and 2.

Sugarbeet, Crystal 817, was planted on May 16 and 25 at Fargo and Glyndon, respectively 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. A 22-inch row spacing was used. Counter was surfaced band applied at 11.9 lbs/a and incorporated with chain at planting. Post emergence herbicides, cultivation and hand labor was used as needed for weed control. One application each of Eminent and Super Tin were applied for Cercospora leafspot control.

Sugarbeet were harvested September 18 and 19 at Fargo and Glyndon, respectively. 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 could result in seed damage and decreased sugarbeet stand establishment. Sugarbeet response to the application of dry starter fertilizer was consistent at the two locations (Table1and 2). Dry fertilizer application was equally as good or better than liquid fertilizer with respect to recoverable sugar production. The significant decrease in recoverable sugar with the application of liquid starter at the Glyndon location was unexpected, although there is a similar trend at the Fargo site as well. In both locations, this decrease is due to a decreased sucrose percentage more than the effect on root yield. The harvest sugarbeet population was significantly decreased with the increased amount of nitrogen associated with the 11.2 lbs/a P_2O_5 application rate at the Glyndon location. These one-year results need verification with additional years of data.

Table 1. Effect of starter fertilizer on root yields, sucrose percentage, sucrose loss to molasses, recoverable sugar production, and harvest population (September 18), Fargo, ND, 2001.

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	24.0	16.8	1.3	7445	140
10-34-0	3.3	11.2	24.4	16.3	1.4	7263	131
10-50-0	2.2	11.2	24.7	16.7	1.4	7552	143
10-50-0	3.3	16.5	25.6	16.6	1.3	7806	133
18-46-0	4.4	11.2	24.4	16.8	1.3	7553	136
18-46-0	3.3	8.4	24.1	16.8	1.4	7449	134
LSD (.05)			NS	0.5	0.1	NS	NS

Table 2. Effect of starter fertilizer on root yields, sucrose percentage, sucrose loss to molasses, recoverable sugar production, and harvest population (September 19), Glyndon, MN, 2001.

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	23.9	17.1	1.3	7555	158
10-34-0	3.3	11.2	23.6	16.5	1.4	7129	156
10-50-0	2.2	11.2	23.8	16.3	1.4	7225	158
10-50-0	3.3	16.5	23.7	17.3	1.4	7557	164
18-46-0	4.4	11.2	24.2	17.6	1.4	7839	148
18-46-0	3.3	8.4	25.31	17.4	1.3	8129	157
LSD (.05)			1.3	0.7	0.1	416	14