

BREDEHOEFT, MARK* and CHRIS DUNSMORE, Southern Minnesota Beet Sugar Cooperative, 83550 County Road 21, Renville, MN 56284. **Evaluation of infurrow products to enhance sugar beet production.**

ABSTRACT

Pop-up fertilizer testing by SMBSC Research has shown there is a benefit to using 10-34-0 starter fertilizer to enhance sugarbeet production. A test was developed in 2008 to test various pop-up products and determine if any of the tested products alone or in combination with 10-34-0 would further increase production.

Methods:

Sugarbeets were planted at three locations in 2008, two locations in 2009 and two locations in 2010 to test the influence of pop-up fertilizer and amendment products on sugarbeet production. The site specific data is included in table 1. The locations were at Bird Island, Wood Lake and Clara City, MN in 2008, Clara City and Hector, MN in 2009 and Bird Island and Maynard, MN in 2010. Table 1 shows the combined data for 2008 and 2009. Table 2 and 3 show the specifics of activities conducted at each site in 2010. Table 4 shows the combined data for 2010. Plots were 11 feet (6 rows) wide and 35 feet long. Pop-up fertilizers and amendments were applied at planting time with a 6 row planter. Mixtures of product tested were applied as a 6 gal per acre mix. The mixtures had 3 gallon of the treatment mixed in with 3 gallon of water to allow for more efficient application of treatments.

In 2008 and 2009 five of the research trials were harvested with a 1 row research harvester. Two quality sub samples were collected from each plot and analyzed for quality and weighed for yield calculation. Each sample was collected from 10 feet of row. Harvest data was collected from rows 3 or 4 of a 6 row plot. In 2009 the Hector site and both of the sites in 2010 were harvested with a 2 row research harvester and the whole plot length was harvested. One sub-sample was collected from each plot and analyzed for quality. Statistical analysis of the data for homogeneity of combinability determined that the data could be combined across locations within years. The years 2008 and 2009 could be combined. 2010 could not be combined with 2008 and/or 2009.

Materials:

Pop-up fertilizer used in this experiment was 10-34-0. Soygreen® is a dry water soluble powder 6% Iron ORTHO-ORTHO EDDHA Chelate. Redline™ contains many nutrients that are necessary for plant growth as well as the same technology that is used in Soygreen®. A three gallon application of redline provides 1 lb. of Soygreen. EB Mix® is a product containing a blend of nitrogen, sulfur, boron, iron, manganese and zinc. JumpStart® contains the naturally occurring fungus *Penicillium bilaii*, which naturally forms Carboxilic acid and helps increase the amount of phosphate readily available to plants by releasing bound phosphate from the soil. MAN-GRO DF is a highly concentrated water soluble manganese powder designed for foliar application. It is designed to combat Glyphosate induced Manganese Deficiency that has been

known to occur in glyphosate resistant plants. Boron was applied using Tetra-Bor 10. The product contains 10% boron as well as some macro-nutrients.

Table 1. Site Specifics for Pop-up Fertilizers, 2008-2010

Task	Location						
	2008			2009		2010	
	Wood Lake	Clara City	Clara City	Clara City	Hector	Maynard	Bird Island
Sugarbeet variety	95RR03	4017 RR	SM RR01	RR 201	RR 201	SV835RR	H255
Planting date	5/5/2008	5/9/2008	5/20/2008	4/24/2009	4/28/2009	4/27/2010	4/29/2010
Fertility							
Nitrogen	77	75	76	75	52	99	121
Phosphorus	7.9	8.0	8.0	8.0	7.9	7.7	7.5
Potassium	165	244	205	244	164	180	181
OM.	4.3	5.2	5.0	5.2	5.5		5.5
Fertilizer Applied							
Nitrogen	30 lbs.	30 lbs.	30 lbs.	35 lbs.	30 lbs.	30 lbs.	0 lbs.
Phosphorus							
Potassium							
Harvest	10/3/2008	10/12/2008	9/26/2008	10/24/2009	10/21/2009	10/19/2010	10/2/2010

Combined 2 year Data 2008-2009

Table 2. Pop-up Fertilizer and its affects on Sugarbeet Quality and Revenue as a Percent of Means

Trt	Product	Rate	Timing	Tons	Sugar	Purity	Ext. Suc Per Ton	Ext.Suc Per Acre	% Revenue
1	Soygreen	1 lbs.	at planting in furrow	31.8	16.4	91.6	280	8869	106.8
2	Broadcast P	45 lbs	at planting incorporated	30.1	16.4	91.6	280	8400	101.1
3	Soygreen	2 lbs.	at planting in furrow	29.9	16.2	91.6	277	8242	98.2
4	Pop-up (10-34-0)	3 gal	at planting in furrow	30.4	16.0	91.5	273	8231	96.8
5	Untreated	N/A	N/A	30.0	16.2	91.7	277	8281	98.9
6	Nutriplant(4-15-12)	4 oz	at planting in furrow	29.8	16.3	91.7	278	8259	99.0
7	Jump Start	seed treated	at planting	30.1	16.2	91.5	275	8260	98.2
8	ManGro DF	2 lbs	at planting in furrow	30.2	16.2	91.6	277	8306	99.0
9	ManGro DF	3 lbs	at planting in furrow	30.7	16.3	91.7	278	8541	102.5
10	Boron	1.81 gal	at planting in furrow	30.5	16.2	91.7	277	8334	99.5

CV	7.6	3.5	1.1	4	9	10.8
LSD (.05)	1.6	NS	NS	NS	467	NS

1020 Maynard Starter Product Plus Additives

Table 3. Pop-up Fertilizer and its affects on Sugarbeet Quality and Revenue as a Percent of Means, 2010

Trt No.	Product	Rate/Acre	Timing	Tons	% Sugar	Purity	Ext. Suc Per Ton	Ext. Suc Per Acre	% of Revenue
1	Soygreen	1 lbs.	at planting in furrow	20.9	16.24	90.38	273	5689	93.17
2	Broadcast P	45 lbs	at planting incorporated	19.5	16.28	90.94	276	5380	88.99
3	10-34-0	3 gal	at planting in furrow	20.6	16.54	90.12	277	5712	94.81
4	Soygreen + 10-34-0	1 lbs. + 3 gal.	at planting in furrow	21.4	16.31	90.89	276	5897	97.58
5	Untreated	N/A	N/A	18.1	16.29	90.03	272	4929	80.64
6	Redline	2 gal	at planting in furrow	22.5	16.66	91.39	284	6416	109.10
7	Redline	3 gal	at planting in furrow	23.2	16.59	91.31	283	6560	110.68
8	EB Mix	1 qt	at planting in furrow	22.0	16.51	92.59	286	6276	106.79
9	EB Mix + 10-34-0	1 qt. + 3 gal.	at planting in furrow	26.1	16.28	91.28	277	7198	119.24
10	ManGro DF	3 lbs	at planting in furrow	26.5	16.12	90.72	272	7194	117.67
11	Boron	1.81 gal	at planting in furrow	20.8	16.54	90.89	280	5836	97.74
12	Untreated	N/A	N/A	17.4	16.61	91.40	283	4936	83.59

CV **6.8 3.08 1.22 4 8 100.00**
LSD (0.05) **2.1 NS 1.59 NS 709 15.47**

1021 Bird Island Starter Products

Table 4. Pop-up Fertilizer and its affects on Sugarbeet Quality and Revenue as a Percent of Means, 2010

Trt No.	Product	Rate/Acre	Timing	Tons	% Sugar	Purity	Ext. Suc Per Ton	Ext. Suc Per Acre	% Revenue
1	Soygreen	1 lbs.	at planting in furrow	21.0	15.99	90.71	270	5656	99.92
2	Broadcast P	45 lbs	at planting incorporated	19.5	16.16	90.56	272	5313	94.48
3	10-34-0	3 gal	at planting in furrow	19.5	15.90	91.01	269	5362	94.58
4	Soygreen + 10-34-0	1 lb. + 3 gal.	at planting in furrow	23.1	15.93	90.53	268	6169	108.22
5	Untreated	N/A	N/A	18.2	16.30	91.03	276	5033	90.81
6	Redline	2 gal	at planting in furrow	22.9	15.91	90.18	266	6077	106.05
7	Redline	3 gal	at planting in furrow	23.7	15.77	90.86	266	6295	109.87
8	EB Mix	1 qt	at planting in furrow	22.2	15.91	90.68	268	5950	104.49
9	EB Mix + 10-34-0	1 qt. + 3 gal.	at planting in furrow	22.1	15.86	90.26	265	5851	101.93
10	ManGro DF	3 lbs	at planting in furrow	22.2	15.90	90.47	267	5931	103.96
11	Boron	1.81 gal	at planting in furrow	19.7	16.06	91.14	272	5375	95.73
12	Untreated	N/A	N/A	19.7	15.83	90.01	264	5188	89.97

CV **7.0 2.30 1.00 3 7 8.82**
LSD (.05) **2.1 NS NS NS 611 12.70**

Combined Data for 2010

Table 5. Pop-up Fertilizer and its affects on Sugarbeet Quality and Revenue as a Percent of Means, 2010

Trt No.	Product	Rate/Acre	Timing	Tons	% Sugar	Purity	Ext. Suc Per Ton	Ext. Suc Per Acre	% Revenue
1	Soygreen	1 lbs.	at planting in furrow	20.9	16.11	90.54	271	5673	96.54
2	Broadcast P	45 lbs	at planting incorporated	19.5	16.22	90.75	274	5347	91.74
3	10-34-0	3 gal	at planting in furrow	20.1	16.22	90.56	273	5537	94.70
4	Soygreen+10-34-0	1 lb.+ 3 gal.	at planting in furrow	22.2	16.12	90.71	272	6033	102.90
5	Untreated	N/A	N/A	18.2	16.30	90.53	274	4981	85.73
6	Redline	2 gal	at planting in furrow	22.7	16.28	90.78	275	6246	107.57
7	Redline	3 gal	at planting in furrow	23.4	16.18	91.08	274	6428	110.27
8	EB Mix	1 qt	at planting in furrow	22.1	16.21	91.64	277	6113	105.64
9	EB Mix + 10-34-0	1 qt. + 3 gal.	at planting in furrow	24.1	16.07	90.77	271	6525	110.58
10	ManGro DF	3 lbs	at planting in furrow	24.3	16.01	90.59	270	6563	110.81
11	Boron	1.81 gal	at planting in furrow	20.3	16.30	91.02	276	5606	96.74
12	Untreated	N/A	N/A	18.5	16.22	90.70	274	5062	86.78

CV	8.6	2.63	1.12	4	9	9.79
LSD (.05)	1.6	NS	1.08	NS	518	11.03

Results and Discussion:

Data presented in tables 2-5 are Tons per acre (Tons), sugar percent (% sugar), purity, extractable sugar per ton (ext. suc. per ton), extractable sugar per acre (ext. suc. per acre), and percent of revenue (% revenue). The percent of revenue is the treatments revenue relative to the mean expressed as a percent. The data presented from 2008 and 2009 are presented as combined data across locations and years (table 2) and the data from 2010 is presented from individual sites (table 3 and 4) and combined across locations (table 4).

The combined data over 2008 and 2009 showed the treatment to be statistically non-significant for many of the variables measured except for tons per acre and extractable sugar per acre. Soygreen applied at 1 lb. per acre influenced tons per acre greater than all other treatments. The increase in tons per acre resulted in similar effect on extractable sugar per acre. Revenue expressed as a percent of the mean showed a tendency to be higher with Soygreen applied at 1 lb., per acre. Mangro applied at 3 lbs. per acre tended to increase revenue percent of mean more than Mangro applied at 2 lbs. acre.

The previously discussed results lead to Soygreen at 1 lb. and Mangro at 3 lbs. per acre being selected as treatments in the 2010 research trials. Due to other experiments conducted in 2009, mixtures of Soygreen and popup (10-34-0) fertilizer (Redline type mixture) were tested in 2010 and gave results showing a tendency or an actual increase in tons per acre, purity, extractable sugar per acre and percent revenue of the mean. EB-mix also showed an increase in the factors mentioned previously as well as a tendency for an additional increase when mixed with popup fertilizer. Mangro applied at 3 lbs. per acre showed a similar influence on the factors influenced by Redline and EB-mix with popup fertilizer.