EFFECT OF NITROGEN AND OTHER FERTILIZERS ON YIELD AND QUALITY OF SUGAR BEETS

A. R. Downiel

Fertilizer strip tests were made in the following beet growing areas in 1946: Rocky Ford, Colorado; Grand Island, Nebraska; Mason City, Iowa; Chaska, Minnesota; and East Grand Forks, Minnesota. With the exception of the East Grand Forks test, the mixed fertilizers and treble super phosphate were applied on twenty-four row strips at the time of planting and twelve of these rows were side-dressed with a nitrogenous fertilizer shortly after thinning.

Yields were obtained by harvesting the entire twelve row strips and weighing over the dump, getting the actual yields of the tared loads. At least two, and in most cases four samples, were analyzed for sucrose, and apparent purities were run on two samples from each strip.

GRAND ISLAND TEST

Four tests were planted in this area, but due to inclement weather only one test was harvested. In Table 1 are given the data. The nitrogenous fertilizer used for side-dressing was ammonium nitrate at 179 pounds per acre. The most substantial increases were obtained through the combination of mixed fertilizers plus side-dressing with nitrogen, with the latter giving the highest increment of yield. Probably because this field had been in corn for the previous three years this increase in yield did not seem to effect sugars or apparent purities.

TEST AT ROCKY FORD, COLORADO

The same plan was followed for the tests in the Rocky Ford area as was followed in the Grand Island area. The side-dressing was made with ammonium sulphate at the rate of 200 pounds per acre.

Tables 2, 3, and 4 give the results of the individual tests, while a summarization of all three tests is included in Table 5.

The Rocky Ford test was planted following a crop of sweet clover which had been plowed under in the Fall of the year. This may explain the poor response due to side-dressing with ammonium sulphate.

The crop history of the field in the Las Animas strip tests was: beets in 1943, onions in 1944, and corn in 1945. The highest sugar per acre yield was obtained with 4-24-4 side-dressed. The effect of ammonium sulphate on sucrose per cent was quite variable although it did not seem to effect the apparent purity of the beets.

1 Plant Pathologist, American Crystal Sugar Co.

The test at Fowler, Colorado was planted on a field that had been in corn in 1944 and onions in 1945. The greatest increases in yields were obtained from the strips which received 6-30-0 and 0-43-0 and these same fertilizers in combination with side-dressing. Although there was little effect on sucrose per cent, the 0-43-0 strip was unusually high. There was no measureable effect on purities as may be noted from Table 4.

Since there were differences in soil types and in crop rotations between the districts, any extreme differences in yield at any one place level off somewhat in the general averages given in Table 5. It can be concluded, however, that there is a need for phosphate in all three districts and that the application of ammonium sulphate did not adversely effect the sucrose per cent.

TESTS IN MASON CITY AREA

Tables 6, 7, 8, and 9 give the results for the individual tests in the Mason city districts. It will be noted that the rate of side-dressing was 100 pounds of ammonium sulphate. From the results on sucrose per cent and apparent purities and also from the slight response in yield, it may be possible that a 200 pound rate of ammonium sulphate might reflect more favorably on yields. The test at Britt is an exception to the above statement since there was a tendency to suppress yields with side-dressing. However, this field had been in pasture for the four years previous to the beet crop and seemed to have an adequate supply of nitrogen.

Below are listed the crop rotations for the three other fields.

	1945	1944	1943	1942
Bricelyn	Sweet Corn	Sweet Corn	Flax	Corn
Blue Earth	Clover	Oats	Corn	-
Truman	Oats & Clover	Corn	Flax	Corn

Table 10 presents the combined data for all 4 locations. Indications are that a complete fertilizer gives slightly better yields than did 0-12-12 and a much better pounds sugar per acre yield than no fertilizer at all.

TESTS IN CHASKA AREA

All side-dressings in this area were made with ammonium sulphate at 100 pounds per acre. Tables 11, 12 and 13 give the data on the individual tests and Table 14 gives the summarization for all three tests. Below are listed the crop rotations for the three fields.

	1945	1944	1943
Mankato	Oats	Corn	Corn
Winthrop	Oats	Alfalfa	Alfalfa
Olivia	Oats	Sweet Corn	

- 96 -

In general there was a profitable increase in yield due to the sidedressing with ammonium sulphate. There was little effect on per cent sucrose and the apparent purities were not seriously altered.

TESTS IN EAST GRAND FORKS AREA

Tables 15 to 19 inclusive give the data on the individual tests in this area. All fertilizers were applied at seeding time with no subsequent fertilization. Differences in sucrose per cent and in apparent purities were not too great. The greatest increase in tonnage was obtained with the heavier application of 2-12-6. This same treatment also had the highest yield of pounds sugar per acre when the averages for all districts are considered (Table 20)

The Moorhead, East Grand Forks and Crookston tests were all planted following sweet clover-summer fallow, while the Alvarado test was planted following five years of alfalfa and summer fallow. The Grafton test was planted after a crop of crested wheat and brome grass which had been plowed under and summer fallowed.

DISCUSSION

The fertilizer strip tests were planted on several soil types even when only one area is considered. The Rocky Ford tests were grown on a fine sandy loam but the influence of rotations seemed to play an important role as may be noted from the effect of plowing under sweet clover.

The Grand Island test was grown on a Hall silt loam which was lacking considerably in organic matter.

The Chaska and Mason City tests were grown on a Clarion-Webster Soil Association which is usually high in organic material. However, the Britt test again indicates that crop rotations can materially effect fertilizer results. The fact that this field had been in pasture for several years previous to beets and from the results obtained, one can only conclude that there was an adequate supply of available nitrogen.

The East Grand Forks tests were grown on the Fargo-Bearden Soil Association and in this territory the rotations of the individual farmers are more nearly alike than one would find almost anywhere else, especially immediately preceding the beet crop. This, together with the soil type makes for more uniformity of results and hence for more reliable generalizations as to fertilizer requirements.

TABLE I

Final Results of Fertilizer Strip Test

Grand Island, Nebraska 1946

								-
Fertilizer	Rate & Cost of Fertilizer per Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre	
4-24-4 4-24-4 SD	177 \$3:97 177 10.74	1:72 5.02	\$2:31 2.14	11.34 14.64	17.2 16.8	88.7 90.2	3901 4919	
4-24-4 / 10% Boron 4-24-4 / 10% Boron SD	188 3:97 188 10.74	-1.02	1.67	8:60	18:1 18.0	89.9 89.9	3113 5407	1
2-12-6 2-12-6 SD	189 3.73 189 9.10	1:50 3.99	: 2:49 2.28	11:12 13.61	16:4 16.5	89.6 88.3	3647 4491	6 1
10.2-21.5-0 10.2-21.5-0 SD	178 5.05 178 10.42	1.11 5.52	4:55	10:73 15.14	16:37 17.35	91.2 77.3	3513 5254	
0-43-0 0-43-0 SD	148 4:73 148 10.10	.18 4.36	26:28 2.32	9:80 13.97	16:3 16.0	90:1 91.2	3195 4470	
0-0-0 0-0-0 SD	- 5.37	3.24	<u> </u>	9:62 12.86	17:25	91:4 90.2	3319 4480	

•							
Fertilizer	Rate & Cost of Fertilizer per Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
4-24-4 4-24-4 SD*	180 \$4:95 180 9.85	2.08 1.42	\$2:38 6.94	12:04 11.38	15:2 14.5	87.6 86.0	3660 3300
4-24-4 / 10% Boron 4-24-4 / 10% Boron SD	203 6.19 203 11.09	1:95 2.11	3:17 5.26	11:91 12.07	15.4	89.1 86.9	3668 3693
10-16-8 10-16-8 SD	207 6:83 207 11.73	:67 •43	10:19 27.28	10:63 10.39	14.9 14.9	89:9 90.6	3167 3096
6-30-0 6-30-0 SD	167 5:34 167 10.24	.80 .31	6:68 33.03	10:76 10.27	15:2 14.9	89:4 88.3	3271 3060
0-43-0 0-43-0 SD	208 5:41 208 10.31	:45	12:02 6.92	10:41	15:3 15.1	89:2 88.6	3185 3457
0-0-0 0-0-0 SD	- 4.90		-	9:96 9.27	15:9	90:6 89.0	3167 2929

Final Results of Fertilizer Strip Test, Rocky Ford, Colorado Harvested December 1946

*SD - Twelve rows of each strip were side-dressed after thinning at the rate of 200 lbs. of 20-0-0 per Acre. Cost of 200 lbs. 20-0-0 (\$4.90) is additional in all side-dressed plots.

Notes: 1. A very reliable test. The field had to be replanted in May and was harvested December 14th after the snow storm.

2. The beets followed sweet clover and grain: the sweet clover being plowed under in the fall.

3. Only in the case of 0-43-0 was there definite increase due to side-dressing with Nitrogen.

Fertilizer	Rate & Cost of Fertilizer per Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
4-24-4	191 \$5.05	0:97	\$5:21	14:23	17:1	. 85.9	4867
4-24-4 SD*	191 9.95	2.55	3.90	15.81	16,7	86.0	5281 .
4-24-4 / 10% Boron 4-24-4 / 10% Boron SD	189 5:76 189 10.60	1:02	5:65	14:28 15:47	15:6	88.6 86.1	4455 5229
10-16-8	185 6:10	1:29	4:73	14:55	16:7	84:2	4860
10-16-8 SD	185 11.00	0.97	11.34		16.2	83.4	4611
6-30-0	175 5.60	30	11.54	12:96	15:1	84.2	3914 00
6-30-0 SD	175 10.50	0.91		14.17	15.2	84.5	4308
0-43-0	135 3:71	1:43	2:59	14:69	16:9	85:0	4965
0-43-0 SD	135 8.61	0.30	23.70	13.56	16.0	86.6	4339
0-0-0 0-0-0 SD	- :00	2.04		13.26 15.30	16:0 15.0	85.9 84.2	4243 4590

Final Results of Fertilizer Strip Test at Las Animas, Colorado Harvested October 1946

*SD - Twelve rows of each strip were side-dressed 20-0-0 at the rate of 200 lbs. per acre. Cost of 200 lbs. of 20-0-0 (\$4.90) is additional in all side-dressed plots.

Notes: 1. The greatest increase in yield was in the 4-24-4 side-dressed strip. This strip also had the highest sugar per acre yield.

2. In this test side dressing with nitrogen had practically no effect on purities and the 6-30-0

strip was the only one that was lower in per cent sucrose.

3. This was a very good test.

	Pata & Cast		Fort Cost				
Fertilizer	of Fertilizer per Acre	Tons Increase	per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
4-24-4 4-24-4 SD*	180 \$4:95 180 9.85	.04	\$123.75 44.77	16:50 16.68	16.85 15.25	86:6 87.4	5560:1 5088.9
4-24-4 ≠ 10% Boron 4-24-4 ≠ 10% Boron SD	194 — 194 10.82	1.07	 10,11	17.53	16.70	88.6	5854.7
10-16-8 10-16-8 SD	188 6.20 188 11.10	.68 .96	9.12 11.56	17.14 17.42	16.25	87.5	5570.7 5800.9
6-30-0 6-30-0 SD	202 6:46 202 11.36	3:25 4.89	1:99 2.32	19.71 21.33	15.80	85:4 87.9	6227.4 6378.9
0-43-0 0-43-0 SD	190 4.94 190 9.84	1:24 4.74	3:98 2.08	17.70	18:05	88.6 86.0	6387.9 6260.8
0-0-0 0-0-0 SD	4.90	.76	6.45	16:46	15:35 17.30	86:8 87.6	5052:9 5957.7

Final Results of Fertilizer Strip Test at Fowler, Colorado Harvested October 1946

*SD - Twelve rows of each strip were side-dressed after thinning at the rate of 200 lbs. of 20-0-0 per Acre. Cost of 200 lbs. 20-0-0 (\$4.90) is additional in all side-dressed plots.

Notes: 1. The strip of 4-24-4 / 10% Boron had a ditch running through the center; as a result it could not be harvested.

2. This was a very good test and the yields are actual yields of the tared loads.

3. The greatest yield increases were with 6-30-0 side-dressed and 0-43-0 side-dressed, while the highest sugar per acre yield was the strip with 0-43-0 at 190 lbs. per acre.

4. In this test for all practical purposes side-dressing with 200 lbs. of 20-0-0 per acre had little or no effect on purities and all fertilized strips except 4-24-4 / 10% Boron SD had a higher sucrose content than the unfertilized check.

TOT

Final Results of Fertilizer Strip Tests-Rocky Ford Area 1946

		Rocky Fo	ord		Las Anir	nas		Fowler		3 Loc	ation Av	eraģe
	Tons	% I	bs.Sugar	Tons	%]	bs. Sugar	Tons	00	Lbs. Sugar	Tons	00	Lbs. Sugar
Fertilizer	per A.	Sucrose	per A.	per A.	Sucrose	per A.	per A.	Sucrose	per A.	per A.	Sucrose	per A.
4-24-4 4-24-4 SD	12:04 11.38	15:2 14.5	3660 3300	14:23 15.81	17.1	4867 5281	16:50 16.68	16.85 15.25	5560 5089	14:25 14.62	16:38 15.48	4696 4551
4-24-4 / 10% Boron 4-24-4 / 10% Boron SD	11:91 12.07	15:4 15.3	3668 3693	14.28 15.47	15.6	4455 5229	17.53	16.70	5854	13.10* 15.02	15.50* 16.30	4062* 4926
10-16-8 10-16-8 SD	10:63	14:9 14.9	3167 3096	14:55 14:23	16:7 16.2	4860 4611	17:14 17.42	16.25	5571 5801	14.11 14.01	15.95	4533 4503
6-30-0 6-30-0 SD	10:76	15.2 14.9	3271 3060	12.96 14.17	15:1 15.2	3914 4308	19:71 21.33	15:80 14.95	6227 6379	14:48 15.26	15:36	4471 87 4582 1
0-43-0 0-43-0 SD	10:41	15:3 15.1	3185 3457	14:69 13.56	16:9 16.0	4965 4339	17.70 19.20	18:05 16.30	6388 6261	14:26 14:74	16:75	4846 4686
0-0-0 0-0-0 SD	9:96 9.27	15:9 15.8	3167 2929	13:26 15.30	16:0 15.0	4243 4590	16:46 17.22	15:35 17.30	5053 5958	14:74 13.93	15:75 16.03	4154 4492

* 2 location average

TABLE 6	
---------	--

Fertilizer	Rate of F per	& Cost ertilizer Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre	
4-24-4 4-24-4 SD*	200 200	\$6.00 8.55	4.46	\$1.35	12.19	16.5		4009	
2-12-6 2-12-6 SD	320 320	5,86 8,41	4.42	1:33 1.72	12:15	16:7	90:71 88.54	4045 42 48	
2-12-6 ≠ 10% Boron 2-12-6 ≠ 10% Boron SD	320 320	6:66 9.21	4.18 3.49	1.59 2.64	11.91	16.6 17.1	91.22 89.92	3953 3825	
0-12-12 0-12-12 SD	266 266	-	4.19 4.07		11.92 11.80	16.8	88.20 90.40	3992 3975	00 -
0-0-0 0-0-0 SD	100	2.55	<u>.</u> 1.96	1.30	7.73	15:9	89:33 90.79	2474 3198	

Final Results of Fertilizer Strip Test at Bricelyn, Iowa, 1946

SD* - Twelve rows of each strip were side-dressed after thinning at the rate of 100 lbs. of 20-0-0 per acre. Cost of 100 lbs. 20-0-0 (\$2.55) is additional in all side-dressed plots.

TAI	BLI	E 7
-----	-----	-----

Final Results of Fertilizer Strip Test at Blue Earth, Iowa, 1946

Fertilizer	Rate & Cost of Fertiliz per Acre	er Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
4-24-4 4-24-4 SD*	200 \$6:00 200 8.55	•77	\$7.79	10.15	16.4	88.15	3320
2-12-6 2-12-6 SD	320 5:86 320 8.41	5,29 7.34	1.11 1.15	14.67 16.72	15.2 15.9	88.34 87.66	4460 5302
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	320 6:66 320 9.21	5.81 4.56	1:15 2.02	15.19 13.94	16.2 16.1	87.93 88.05	4906 4487
0-12-12 · · · · · · · · · · · · · · · · · · ·	266 266	2:29 2.96		11.67 12.34	16:2 15.9	26:44 87.79	3779 to 3923 t
0-0-0 0-0-0 SD	100 2.55	.70	3.64	9:38 10.08	15:1 15.6	85.71	2851 . 3134

*SD - Twelve rows of each strip were side-dressed after thinning at the rate of 100 lbs. of 20-0-0 per Acre. Cost of 100 lbs. 20-0-0 (\$2.55) is additional in all side-dressed plots.

.

Final Results of Fertilizer Strip Test at Truman, Iowa, 1946

Fertilizer	Rate & Cost of Fartilizer per Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre.
4-24-4 4-24-4 SD*	200 \$6:00 200 8.55	3:13 4.13	\$1:92 2.07	11:34 12.34	17:5	89.00 89.81	3969 4307
2-12-6 2-12-6 SD	320 5.86 320 8.41	2.66 2.08	2:20 4.04	10:87	16.9 16.9	88.06 89.10	3663 3488
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	320 6.66 320 9.21	2.01 2.80	3:31 3.29	10:22 11.01	17:4	91.26 88.97	3555 3863
0-12-12 0-12-12 SD	266 266	2:20 2.34		10:41	16.8	_	3486 501 3523 1
0-0-0 0-0-0 SD	100 2.55	1.38	1.85	8.21 9.59	16:3 16.2	87:39 87.27	2675 3106

*SD - Twelve rows of each strip were side-dressed after thinning at the rate of 100 lbs. of 20-0-0 per Acre. Cost of 100 lbs. 20-0-0 (\$2.55) is additional in all side-dressed plots.

A m	TOT	123	0
1 A	RI	. 14.	4
4.00	101		1

Fertilizer	Rate of F per	& Cost ertilizer Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Apparent Sucrose Purity		Lbs. Sugar per Acre			
4-24-4 4-24-4 SD*	200 200	\$6:00 8.55	1:83	\$3:28 20.36	14:10 12.69	16:9 17.4	88:77 87.05	4767 4417			
2-12-6 2-12-6 SD	320 320	5:86 8.41	1:59	3:69 21.56	13:86 12.66	17:2 16.8	87:90 87.80	4768 4255			
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	320 320	6:66 9.21	1:64 2,19	4.06	13:93 14.46	17:5	88:43 86.47	4874 5004			
0-12-12 0-12-12 SD	266 266		:24 -1.20		12:51	17:7	88.23 87.55	4427 3841			
0-0-0 0-0-0 SD	100	2.55	<u>.</u> 31	=	12:27	17:8	88.87 88.01	4368 4185			

Final Results of Fertilizer Strip Test at Britt, Icwa, 1946

*SD - Twelve rows of each strip were side-dressed after thinning at the rate of 100 lbs. of 20-0-0 per Acre. Cost of 100 lbs. 20-0-0 (\$2,55) is additional in all side-dressed plots.

1771 A	DT	177	71.4	0
TA	p1	17	11	U

	-	Bricely	m ·	•	Blue Ear	th		Truman	
	Tons	%	Lbs, Sugar	Tons	%	Lbs. Sugar	Tons	%	Lbs. Sugar
Fertilizer	per A.	Sucrose	per Acre	per A.	Sucrose	per Acre	per A.	Sucrose	per Acre
4-24-4 4-24-4 SD	12.19	16.5	4009	10.15	16.4	3320	11:34 12:34	17.5	3969 4307
2-12-6 2-12-6 SD	12:15 12.61	16.7 16.9	4045 4248	14:67 16.72	15:2 15.9	4460 5302	10:87 10.29	16.9	3663 3488
$2-12-6 \neq 10\%$ Boron $2-12-6 \neq 10\%$ Boron SD	11.91 11.22	16.6 17.1	3953 3825	15:19 13.94	16.2 16.1	4906 4487	10:22 11.01	17.4	3555 3863
0-12-12 0-12-12 SD	11:92 11,80	16:8 16.9	3992 3975	11:67 12.34	16:2 15.9	3779 3923	10:41 10.55	16.8 16.7	3486 3523
0-0-0 0-0-0 SD	7.73 9.69	15:9 16.5	2474 3198	9:38 10.08	15.1 15.5	2851 3134	8.21 9.59	16.3 16.2	2675 5 3106 1
		Briti	3	4 Loc	ation Ave	rage	_	•	
4-24-4 4-24-4 SD	14:10 12.69	16:9 17.4	4767 4417	11:95	16.80 17.43	4016 4362			
2-12-6 2-12-6 SD	13:86 12,66	17:2	4768 4255	12:89 13.07	16:48 16.61	4234 4323			
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	13:93 14.46	17:5 17.3	4874 5004	12.81 12.66	16:91 17.00	4322 4295			
0-12-12 0-12-12 SD	12:51 11.07	17:7 17:4	4427 3841	11.63	16.85 16.70	3921: 3816			
0-0-0 0-0-0 SD	12:27	17:8	4368 4185	9:40 10.33	16:27	3092 3405			

Final Results of Fertilizer Tests-Mason City Area, 1946

Final Results of Mankato Fertilizer Strip Test 1946

Fertilizer	Rate of Fertilizer per Acre	Tons Increase due to 20-0-0	Tons Beets per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Aere
4-24-4 4-24-4 SD	217	1.22	14:15 15:37	13:30 15.00	87:45 88.35	3764 4611
2-12-6 2-12-6 SD	320	0.49	15:51 15.00	15:70	88:90 88.25	4556 4845
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	300	-0.43	15.81 15.38	15:90	88.75	5028 4583
0-18-0 0-18-0 SD	336	0.25	13:73 13.98	14:85	88.85 87.50	4078 4082
2-12-6 2-12-6 SD	320	1.49	14:73	16:30 13.90	88:90 87.80	4802 4509

+ 80t

TA	DT	T	3	2
TH	DI	111	1	he

Fertilizer	Rate of Fertilizer per Acre	Tons Increase Due to 20-0-0	Tons Beets per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre	
4-24-4 4-24-4 SD	225	1.64	14.18 15.82	15:70 15.10	86:40 87 .8 5	4453 4778	
2-12-6 2-12-6 SD	336	1.30	15:94 17.24	15:10	86:70 86.90	4814 5500	
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	342	-0.48	15:24 14.76	14.65	86.70 87.15	4458 4502	
0-18-0 0-18-0 SD	322	1.58	15:47	15:00	87:10 86.35	4641 5217	- 105
3-12-12 3-12-12 SD	195	1.61	15:47	15:95	90;10 85.95	4935 5158	

Final Results of Winthrop Fertilizer Strip Test 1946

Fertilizer	Rate of Fertilizer per Acre	Tons Increase Due to 20-0-0	Tons Beets per acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
4-24-4 4-24-4 SD	223	0.54	15.83 16.37	17:80	90°60 87.60	5635 5337
2-12-6 2-13-6 SD	320	2,18	14:48	17:75	90:35 87,90	5140 5898
2-12-6 / 10% Boron 2-12-6 / 10% Boron SD	300	0.24	14.22 14.46	17:50 17.40	90:35 88.25	4977 5032
0-18-0 0-18-0 SD	305	0.92	14,08	17:65	90.75 86.95	4970 5100
2-12-6 2-12-6 SD	240	0.97	14.65 15.62	17.70	89:82 89,20	5186 5514

Final Results of Olivia Fertilizer Test 1946

TABLE 13

Final Results of Fertilizer Strip Tests in Chaska Area 1946

		Mankato	0		Olivia		W	inthrop		3 Loca	ation Ave	erage
Fertilizer	Tons par A,	% Sucrose	Lbs.Sugar ver A	Tons per A.	% Sucrose	Lbs. Súgar per A.	r Tons per A,	% Sucrose	Lbs.Sugar per A,	Tons Per A.	% I Sucrose	bs. Sugar per A.
4-24-4 4-24-4 SD	14:15	13:30 15.00	3764 4011	15:83 16.37	17.80	5625 5337	14:18	15:70 15.10	4453 4778	14:72	15:60 15:47	4617 4909
2-12-6 2-12-6 SD	14:51	15:70 16.15	4556 4845	14:48	17:75	5140 5898	15:94 17.24	15:10 15.95	4814 5500	14:98	16:18 16.60	4837 5414
2-12-6 / 10% Boron SD	15:81	15:90 14.90	5028 4583	14:22	17:50	4977 5032	15:24	14:65	4458 4502	15:09 14.87	16:02 15.85	4821 4706
0-18-0 0-18-0 SD	13:73 13.98	14.85	4078 4082	14:08	17:65	4970 5100	15:47	15:00 15.30	4641 5217	14:43 15.34	15:83 15.63	4563 4800 II
	• •			•	*.					2'Loca	ation Ave	rage
2-12-6 2-12-6 SD	14:73	16:30 16.05	4802 5207	14:65 15.62	17.70	5186 5514				14:69 15.92 1 Loca	17:00 16.85 ation Ave	4994 5361
3-12-12 3-12-12 SD							15.47	15.95	4935 5158	1547 17.08	15.95	4935 5158

TA	B	LE	1	5
				-

Final Results of Fertilizer Strip Test at Moorhead, Minnesota, 1946

Fertilizer	Rate of F per	& Cost ertilizer Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
0-43-0	150	\$4.50	3.19	1.41	12.96	16.20	90.9	4199
6-30-0	150	5.95	2.44	2.44	12.21	16.22	90.7	3961
0-36-8	175	445	1.54	2.89	11.31	15.27	91.6	3454 1
4-24-4	220	5.80	2.21	2.62	11.98	16.28	90.8	3901
2-12-6	330	6.64	2.21	. 3.00	11.98 .	15.95	85.7	3822
2-12-6	170	3.32	1.80	1.84	11.57	15.47	88.3	3580
Check		-			9,77	16.33	89.3	3191

Fertilizer	Rate of Fe per A	Rate & Cost of Fertilizer per Acre In		Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre			
0-43-0	155	\$4.50	.74	\$6.08	14.19	15.73	88.2	4464			
6-30-0	160	5.95	1.57	3.79	15.02	15.83	89.3	4755			
0-36-8	170	4.45	3.11	1.43	16.56	16.33	90.2	5408			
4-24-4	220	5.80	3.51	1.65	16.96	15.83	88.3	5370	1		
2-12-6	320	6.64	2.69	. 2.47	16.14	16.58	89.0	5352	4		
2-12-6	160	3.32	1.21	2.74	14.66	16.00	88.4	4691			
Check			-		13.43	16.27	89.1	4377			

Final Results of Fertilizer Strip Test at Grafton, Minnesota 1946

Fert. Cost Rate & Cost of Fertilizer 50 Apparent Tons per Ton Tons per Lbs, Sugar Fertilizer per Acre Incroase Increase Acre Sucroso. Purity per Acre 0-43-0 \$4.50 17.30 8.59 145 84.6 2972 --------6-30-0 164 \$2.56 5.95 2.32 11.97 15.73 81.7 3766 0-36-8 164 4.45 .66 6.74 10.31 16.75 84.1 3454 30 1 4-24-4 190 5.80 1.19 4.87 10.84 16.05 81.0 3480 411 -2-12-6 315 6.64 2.98 17.38 84.6 4129 2.23 11.88 2-12-6 12.88 9.90 17.58 83.9 3481 155 3.22 .25 9.65 Check 15.93 83.5 3074 -

Final Results of Fertilizer Strip Test at Alvarado, Minnesota 1946

Final Results of Fertilizer Strip Test at East Grand Forks, Minnesota 1946

						The Works		
Fertilizer	Rate of F per	& Cost ertilizer Acre	Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Sugar per Acre
0-43-0	150	\$4.50	.17	\$26.47	8.77	15.50	86.1	2719
6-30-0	150	5.95			8.31	15.60	82.4	2593
0-36-8	170	4.45	2.41	1.85	11.01	14.90	83.9	3281
4-24-4	190	5.80	.69	8.41	9.29	1530	82.6	2843
0-14-7	220	5.24			7.93	14.60	83.6	2316
2-12-6	240	6.64	2.47	2.69	11.07	15.80	86-2	3498
2-12-6	160	3.32	-		7.44	16.00	82.5	2381
Check			-	ative same	8.60	15.10	84.1	2597

· TABLE 19

Final Results on Fertilize	r Strip Test at	t Crookston,	Minnesota 1946
----------------------------	-----------------	--------------	----------------

Fertilizer	Rate & C of Ferti per Acre	ost lizer Tons Increase	Fert. Cost per Ton Increase	Tons per Acre	% Sucrose	Apparent Purity	Lbs. Suga per Acre
0-43-0 -	150 \$4.	50 2.87	\$1.57	10.35	14.20	85.7	2939
6-30-0	150 5.	95 3.53	1.69	11.01	13.45	83.4	2962
0-36-8	140 4.	45 1.08	4.12	8.56	13.17	83.5	2255
4-24-4	200 5.	80 2.26	2.57	9.74	13.03	83.6	2538
2-12-6	230 6.	64 5.01	1.33	12.49	13.63	87.4	3405
2-12-6	160 3.	32 .97	3.42	8.45	13.33	82.0	2253
Check				7.48	14.03	64.0	2099

Final Results on Fertilizer Tests--East Grand Forks Area, 1946

Moorhead				Graftor	1	Alvarado			
Treatment	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre
4-24-4 2-12-6 2-12-6 6-30-0 0-36-8 0-43-0 0-0-0 Check	11.98 11.98 11.57 12.21 11.31 12.96 9.77	16.28 15.95 15.47 16.22 15.27 16.20 16.33	3901 3822 3580 3961 3454 4199 3191	16.96 16.14 14.66 15.02 16.56 14.19 13.45	15.83 16.58 16.00 15.83 16.33 15.73 16.27	5370 5352 4691 4755 5408 4464 4377	10.84 11.88 9.90 11.97 10.31 8.59 9.65	16.05 17.38 17.58 15.73 16.75 17.30 15.93	3480 4129 3481 3766 3454 2972 3074
									1
									211

	East Grand Forks				Crookston		Average 5 Locations		
Treatment	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre
4-24-4	9.29	15:30	2843	9:74	13.03	2538	11.76	15.30	3626
2-12-6	11.07	15:80	3498	12.49	13.63	3405	12.71	15.87	4041
2-12-6	7.44	16.00	2381	8.45	13:33	2253	10.40	15.68	3277
6-30-0 0-36-8	8:31	15.60	2593 3281	8.56	13.45	2255	11.70	15.28	3570
0-43-0	8:77	15:50	2719	10.35	14:20	2939	10.97	15.79	3459
0-0-0 Check	8.60	15.10	2597	7.48	14.03	2099	9.79	15.53	3068