

# Seed Treatment Studies

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Seed treatment is a standard practice in most of the Territories where sugar beets are grown for the American Crystal Sugar Company. New Improved Ceresan is the most popular seed treatment material, especially in the areas where The seed can be planted immediately after treatment.

In 1944 and 1945 seed treatment tests were conducted in several areas, the following treatments being used: Arasan, New Improved Ceresan, Yellow Cuproside, and Phygon. Four tests were conducted in three different areas of the Rocky Ford Factory, one test each at East Grand Forks, Minn., Grand Island, Neb., and Mason City, Iowa.

Besides the field tests, seed treatment tests in soil obtained from 9 different areas were made in flats in the greenhouse at the Rocky Ford Beet Seed Station.

## Field Results in the Rocky Ford Factory Areas

Sheared seed planted at the rate of approximately 4 pounds per acre was used in all experiments. Plots were four rows wide and 50 feet long with no fewer than six replications in any one test.

Table 1 shows the number of beet-containing inches in 100 inches of row. Each number represents a six-plot overage of five 100-inch counts per plot, except in the 1944 test where 10 replications were used.

Table 1.—The number of beet-containing inches per 100 inches of row.

Treatment	Rate	Rocky Ford		Lamar	Center
Arasan	1:100	11.8*	13.3**	11.9	28.6
New Improved Ceresan	6oz:100	10.2	15.8	6.7	21.7
Ceresan	1:100	12.4	15.7	....	....
Cuproside (Yellow)	1:50	9.5	....	11.6	19.4
Phygon	1:100	....	30.3	....	....
Cheek	None	12.9	26.0	12.1	22.2
Significant difference (10:1)		1.9	8.8	....	5.35

\*1941 results

\*\*1945 results

It is to be noted from table 1 that, in general, seed treatment did not have a beneficial effect in the tests at Rocky Ford. Except in the case of Phygon in the 1945 test, seed treatments tended to give poorer stands than no treatment. The same is true in the Lamar

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test, and especially so in the case of New Improved Ceresan. The Arasan treatment gave significantly better stands than the check and all other treatments at Center, Colo.

#### Tests in Other Areas

The results for the East, Grand Forks, Grand Island, and Mason City seed treatment tests are given in percent stand after thinning (table 2). Treatments were replicated six times in all three tests. The percent stand was obtained by counting the number of beets in 100 feet of row in each plot and is given as a six-plot average.

Significantly better stands were obtained from all treatments in the East Grand Forks test. New Improved Ceresan was significantly better than Cuprocide and no treatment. In the Grand Island test, although all treatments were higher than check, only Arasan was significantly so. There were no significant differences due to treatment in the Mason City experiment.

Table 2.—Percent stand after thinning.

Treatment	Rate	East Grand Forks	Grand Island	Mason City
Arasan	1:100	86.9	75.3	74.4
New Improved Ceresan	6 oz:100	92.9	76.7	74.4
Ceresan	1:100	...	69.2	...
Cuprocide (Yellow)	1:50	88.1	...	...
Phygon	1:100	...	71.0	75.0
Check		78.1	63.5	78.2
Significant difference (19:1)		4.1	9.9	ns

#### Greenhouse Tests

In the fall of 1945, soil samples of approximately 200 pounds each were obtained from the following locations: Oxnard, Clarksburg, and American Island Farm, Calif.; Missoula, Mont.; Rocky Ford, Colo.; Lubbock, Texas; Grand Island, Nebr.; and Chaska and East Grand Forks, Minn. Flats containing soil from each of these locations were planted with sheared seed treated with the following materials: Arasan, New Improved Ceresan, Phygon, and non-treated. Each flat contained 4 replications of 20 seeds of each of the 4 treatments or 16 rows per flat. All seeds were planted 5/8 inch deep and 1 inch apart in the row. During the course of the experiment the nightly temperatures varied from 54° to 57° F. The daytime temperature was 70°, only very occasionally going above 80°. Although daily stand counts were taken, only the total seedling stand 17 days after planting is summarized here.

Table 3 gives the analysis of variance data for the experiment.

Table 3.—Analysis of variance.

Variation due to:	D.F.	Sums of Squares	Mean Squares	F
Seed treatments	3	753.01	251.30	14.84**
Soils	8	803.03	100.45	5.93**
Blocks	3	51.97	17.32	1.02
Treatments x soils	24	485.15	20.21	1.19
Error	106	1,794.78	16.92	
<b>TOTAL.</b>	<b>144</b>	<b>3,886.44</b>		

\*\*Significant difference at the 99:1 level.

From table 3 it may be seen that there are significant differences between treatments and between soils; however, it is to be noted that the F value for the interaction, treatments x soils is not significant. Therefore it may be stated that for this test there was no significant reversal of reaction of any of the treatments between any two soils. No individual treatment was significantly better in one soil and significantly poorer in another soil.

In table 4 are given the average sprout counts (in percent) for all treatments in all soils.

Table 4.—Average of total sprout counts (percent) of each treatment for all soils.

Treatment	Rate	Percent total sprouts
<b>Arasan</b>	1:100	107.5
New Improved Ceresan	6 oz:100	105.3
Phygon	1:200	<b>105.4</b>
Check		79.7
Significant difference (odds 19:1)		9.7

As an average for all soils the three treatments were significantly better than the check, but there were no significant differences between Arasan, New Improved Ceresan, and Phygon in any one soil.

The average sprouts obtained from each of the 3 treatments (excluding check) was figured on the basis of 100 seeds planted and is given in table 5.

Table 5.—Average sprout count of treated seed (on basis of 100 seeds) obtained in nine different soils.

Soil source	Sprouts per 100 seeds
Oxnard	107.0
Clarksburg-	106.9
American Island	100.0
Missoula	110.4
Rocky Ford	110.5
Lubbock	126.3
Grand Island	03.4
Chaska	88.4
East Grand Forks	111.7
Sig. diff. (19:1)	17.0

The counts in table 5 indicate that the seed treatments did not give the same degree of protection in all the soils. This is to be expected since the organisms causing damping off are probably different in some of the soils.

### Conclusions

The seed treatments used in the Rocky Ford and Lamar tests did not give significant increases in stand except in the case of Phygon at Rocky Ford, and this in only one test. There was a tendency for the seed treatments used to depress the stands.

Significantly better stands were obtained from New Improved Ceresan in the test at Center, Colo.

Arasan gave significantly better stands than no treatment at East Grand Forks, Minn., and at Grand Island, Neb. New Improved Ceresan was significantly better than Yellow Cuprocide but was not significantly better than Arasan at East Grand Forks.

Seed Treatment tests conducted in the greenhouse in nine different soils gave significantly better stands when sheared seed was treated with Arasan, New Improved Ceresan, and Phygon than did untreated seed. There were no significant differences among the three treatments for any one soil, nor was any one of the treatments significantly better in one soil and significantly poorer in another soil.

The degree of protection afforded by the three seed treatments was not the same for all soils; for example, significantly better stands were obtained in the soil from Lubbock, Texas, than in the soil from Chaska, Minn. This is most likely a function of the organisms causing damping off in the different soils.