

SEED TREATMENT TESTS - 1943

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The seed-treatment study conducted by the Great Western Sugar Company in 1943 included two series of tests.

The first series, which included six commercially considered treatments with one untreated check, was conducted in ten fields located within a radius of 10 miles around the Longmont, Colorado, factory. The second test series was designed to test out the possibilities and limitations of treatments with fume phosphate in applications of from 5 pounds to 100 pounds of phosphate to 100 pounds of seed, the phosphate being attached to the seed with a weak glue solution as was also a 10-pound phosphate application in the first series. With the exception of one test the entire second series was conducted at the Longmont Experiment Station.

In the following discussion of treatments the 5-percent level, with odds of 19:1, is considered as sufficient to establish practical significance of differences.

First Series of Tests

The ten fields used for this study were located on as many farms and varied greatly with regard to physical condition, tillage, and fertility. Shortage of available phosphate was expected to exist, in various degrees, in most of them. A complete test with 3 replications of 2-row plots, 125 feet in length, was placed in each location. Seedling counts were obtained from 5 strips, 50 inches in length, from each plot.

The seed used was graded, the rate of seeding being calculated for about 15 to 20 germinating seedballs per foot of row.

The results obtained for six of the tests which showed statistically significant differences between treatments are summarized in table 1.

Tests A and C were planted just before the onset of a wet period which began April 7 and brought 1.15 inches of moisture in about 5 days. Planting of the tests was resumed as soon as conditions permitted and was in progress during a succeeding hot, dry period, with the last test put in on April 22.

It should be noted that in no case was there any appreciable mortality between emergence and thinning. Consequently, the results of the treatments could be reflected only in the effect upon pre-emergence mortality, and the counts made may be

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considered representative of both germination stand and stand available at thinning time.

Table 1.- Tests with seed treatment on several farms--
1943.

No.	Treatments Materials used a/ (oz. per 100 lb. seed)	Average Number of Plants per Plot					
		A	B	C	D	E	F
1	Cer. 4	292.7**	401.0**	363.3**	432.7	480.3	324.7
2	Cer. 4, F.P. 12	269.3**	356.3**	334.0**	397.3	483.0	289.0
3	Cer. 6, F.P. 24	308.3**	278.7	361.3**	442.3	495.7	212.3 ^o
4	Cer. 4, F.P. 12, Cu. 6	255.7**	317.3*	317.7**	501.7*	502.0	255.0
5	Sperguson 8	121.7	241.7	158.7*	354.0	416.3 ^o	261.0
6	F.P. 160	253.0**	256.0	379.7**	521.7*	414.0 ^o	253.7
7	Untr. Ch.	82.0	254.0	76.0	371.7	473.3	275.7
	1sd 5-percent point	47.11	46.65	70.58	91.37	55.74	59.77
	1sd 1-percent point	66.05	65.41	98.95	-	-	-

* and ** Significantly above the untreated check on the 5-percent and 1-percent point levels, respectively.

^o Significantly below the untreated check on the 5-percent point level.

a/ Cer. = Ceresan, F.P. = Fume Phosphate, Cu. = Tri-basic copper sulfate.

The results from the locations not given in table 1 were such as to indicate absence or near-absence of black root. This applies also to location E and perhaps to F, although in the latter the number of plants is generally much below the number for location E. There is also some indication that the ceresan treatment was beneficial in F, but the increase is not great enough to be significant. The results from test D definitely point to the operation of certain disease factors, but the most striking results were obtained from tests C, A, and to a lesser extent, test B, where the effect of pre-emergence mortality is very apparent and the response to certain treatments very great.

It will be noted that treatment (1) ceresan alone 4 ounces; and treatment (2) ceresan 4 ounces plus fume phosphate 12 ounces; each show a significantly higher seedling count than the check in three tests (A, B, C), with ceresan alone giving the higher actual count in each case.

Treatment 3 consisting of ceresan 6 ounces plus fume phosphate 24 ounces is significantly better than the check in two cases (A, C) and significantly poorer in one (F). It should be noted that this treatment also gave a significantly lower count than treatments 1 and 2 in one test (B). The latter fact may indicate that the amount used of each or both of the components of this treatment may have been too great for these locations.

Treatment 4, similar to treatment 2 except for the addition of 6 ounces of tri-basic copper sulfate, is significantly better than the check in four cases, (A, B, C, D). In test D there is also a significant gain over treatment 2, but generally, the values for treatment 4 are more or less below those of treatment 2.

Treatment 5, spergon 8 ounces, shows one case better and one poorer than the check (C, E, respectively), both differences being statistically significant. This treatment appears decidedly inferior generally to the better treatments.

Treatment 6, fume phosphate alone, 10 pounds, gave three counts significantly higher and one count significantly lower than the check (A, C, D, E, respectively). In three cases significant reductions relative to the values from the one or two best treatments were noted (B, E, F). In tests C and D this treatment gave the highest stand counts. The results from field C are particularly remarkable in view of the fact that the values for the untreated check are very low, indicating a rather severe disease condition in the soil.

Second Series of Tests

Since the results obtained in test C indicate at least as effective control by the 10-pound fume phosphate application as for any other treatment, it appeared worthwhile to make further plantings on this field, using from 5 to 100-pound applications. The same treatments were planted at the Experiment Station in several replicated plantings at intervals of about a week to check the effect of these higher phosphate applications under limited soil moisture conditions.

The treatments were replicated six times throughout with one-row plots. These were 28 feet long in the test placed on field C of first series (5/21) and 20 feet long at the Experiment Station. Seedling counts were obtained from the entire length of rows. A net amount of 4 grams of seed, regardless of treatment, was planted per row throughout the second test series. This amount was calculated to give 14 germinating balls per foot of row in the 28-foot rows and 20 germinating balls in the 20-foot rows.

The combined results for this second series of tests are presented in table 2.

In the test in the farmer's field (5/21) there was a consistent improvement in emergence for increasing amounts of fume phosphate up to the 40-pound application. The 100-pound application proved to be an overdose, although it shows nearly three times as many seedlings as the untreated check.

Table 2.- Tests with fume phosphate glued to seed--1943.

Treatment	No.	FP x	5/21a	6/9 a	6/16a	6/16 b	6/24 c	7/2 d	7/9 e	7/9 f
1	0		64.5	86.4	35.0	80.5	138.2	91.0	110.2	11.5
2	5		86.7*	99.0	23.2	99.7	133.5	107.7	175.0**	9.0
3	10		138.5**	95.5	24.8	89.9	135.2	105.4	184.7**	8.3
4	20		214.0**	123.7**	32.8	117.2**	126.7	160.2**	187.5**	8.2
5	40		238.8**	89.9	32.5	127.9**	155.9	98.9	206.5**	10.5
6	100		180.8**	41.2 ^{oo}	9.8 ^o	107.4*	79.5 ^{oo}	110.7	165.9**	2.8 ^o
1sd 5-percent point										
			21.16	25.14	15.23	21.57	26.70	29.37	25.24	5.09
1sd 1-percent point										
			28.62	34.28	-	29.42	36.42	40.06	34.42	-

* and ** Significantly above the untreated check on the 5-percent and 1-percent levels, respectively.

^o and ^{oo} Significantly below the untreated check on the 5-percent and 1-percent point levels, respectively.

a/ Counted before irrigation.

b/ Counted after irrigation.

c/ Counted after irrigation following a long period of inactivity, apparently due to lack of moisture.

d/ Counted after irrigation following 8 days of inactivity due to lack of moisture.

e/ Irrigated up.

f/ Soil very dry. Not irrigated.

x/ F.P. = Fume Phosphate in pounds per 100 pounds seed.

At the Experiment Station the 20-pound and 40-pound applications show statistically significant increases in stand over the check in several cases, and in no case do they show any significant loss in stand. Again the 100-pound application shows a rather definite loss in stand in four tests.

An interesting relationship was noted between apparent toxicity of the heaviest phosphate treatment and low soil moisture as related to precipitation before planting, prolonged drought, and irrigation. The test planted May 21 was put in when the ground was abundantly moist. The planting on June 9 was done following a storm which brought 0.35 inch of moisture and which was preceded by a relatively dry period. A significant reduction in the count is here noted for the 100-pound phosphate application. In the test planted June 16 the count made after the irrigation (18 days after the first count) shows remarkable increases throughout with the 100-pound treatment holding up very well. Before irrigation this treatment was significantly inferior to the check.

GERMINATION OF STORED, TREATED BEET SEED

A study of the effect of storage upon germination of treated seed is under way at the Experiment Station. Among the seed lots included are the residues of the seed used for the field studies in the spring of 1943, together with some portions more recently put in storage. So far no serious damage has been indicated nor has any lesser damage been definitely ascertained.