

A Report on Nutrient Spray Tests on Sugar Beets

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Plants are capable of absorbing many chemicals through their leaf surfaces. Many of the so-called trace elements can be absorbed by the leaf, then translocated to various parts of the plant. Also, some of the growth-promoting substances may be absorbed in this manner. There is some evidence that beneficial results might be obtained by spraying some of the nitrogen-containing materials on foliage of growing plants.

The above considerations were influential in the spray tests which are reported here. Field tests were made in 1948 and 1949 to determine the effect of spraying water solutions or suspensions of various chemicals on the foliage of sugar beets.

Experimental Procedure

The chemicals tested were dissolved or suspended in water so that a uniform application of approximately 30 gallons of spray material was applied per acre. The plot size was three rows wide and 50 feet long with the middle row being harvested for yield and sucrose records. All of the materials were applied with a continuous pressure hand sprayer.

The first applications of spray materials were made about the middle of July with subsequent applications being made at 10 to 14 day intervals.

Table 1.—Chemicals, amounts applied per acre, and yields obtained in spray test at Rocky Ford—1948.

Treatment	Total Amt. Appl'd Acre	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre
15. Milk	16 gal.	18.08	14.87	5,372
14. O-52-0 (liquid)	3.7 lbs. ¹	17.69	14.81	5,222
9. Quick Root (0.15 Indole Butyric Acid)	1.0 lbs.	17.41	14.98	5,221
3. Manganese Sulphate	8.9 lbs.	17.46	14.75	5,139
10. App-L-Set (Naphthyl Acetic Acid)	1.0 lbs.	16.86	14.56	4,900
8. Molasses	15.2 lbs.	16.08	14.90	4,799
13. 5-10-5 (liquid)	7.6 lbs.	15.97	14.90	4,783
7. Sugar (Sucrose)	9.8 lbs.	15.56	14.94	4,660
5. Copper Sulphate	11 lbs.	15.66	14.49	4,550
2. Magnesium Sulphate	8.9 lbs.	15.50	14.56	4,314
12. 11-48-0	34.2 lbs.	15.29	14.65	4,480
16. Check	14.23	15.21	4,318
11. 2,4-D (83%)	6.66 grams	14.44	14.86	4,312
1. Boron	11 lbs.	14.42	14.75	4,282
6. Iron (ferrous) Sulfate	9.8 lbs.	13.90	14.50	4,061
4. Zinc Sulphate	8.9 lbs.	13.36	14.40	3,900
General Mean		15.74	14.76	4,656
Sign. Diff. (19:1)		2.90	.74	893

¹ 1.92 pounds P₂O₅ per acre.

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Test in 1948

An exploratory test was conducted at Rocky Ford, Colorado, in 1948. Only two spray applications were made in this test. The first application was applied on July 2 and the second application on July 15. This test was set up as a randomized block with six replications.

The various chemicals used, the total amount of each application—per acre, and the yield data are presented in Table 1. The data presented in this table show significant increases in tonnage for milk, liquid phosphoric acid, quick root, and manganese sulfate treatments. Of the four materials mentioned, only manganese sulfate did not result in a significantly higher sugar per acre yield.

Table 2.—Nutrient-Hormone-Trace Element Spray Test, Rocky Ford—1949

Treatment	Tons Beets per Acre	% Sucrose	Lbs. Sugar per Acre	Tot. Amt. per Acre
15. Calcium Oxylacetate	25.07	17.56	8,810	2.57 lbs.
9. Copper Oxide	24.94	17.52	8,787	10.28 lbs.
14. 2,4-D	25.09	17.47	8,775	13.52 grams
5. App-L-Set	24.11	17.49	8,465	1.71 lbs.
6. Manganese Sulphate	24.18	17.46	8,456	10.28 lbs.
2. Skim Milk	24.63	17.11	8,446	29.04 gallons
10. Levulose	24.26	17.30	8,407	17.0 lbs.
11. Dextrose	23.67	17.63	8,353	17.0 lbs.
12. Luvulose and Dextrose	23.83	17.50	8,339	8.5 lbs.-8.5 lbs.
13. Sucrose	23.91	17.35	8,320	17.0 lbs.
8. Monosodium Glutamate	23.96	17.23	8,260	10.28 lbs.
4. Quick Root	23.87	17.25	8,247	1.71 lbs.
10. Check	23.72	17.35	8,286
7. Molasses	23.43	17.34	8,159	25.6 lbs.
3. 0-52-0 (Liquid Phosphate)	22.91	17.62	8,079	10.64 lbs.
1. Milk	22.89	17.40	7,965	29.04 gallons
General Mean	23.96	17.41	8,356	
Sign. Diff. (19:1)	2.29	.62	907	

This test indicated that the chemicals applied affected only the yield and not the sucrose content.

Tests in 1949

On the basis of the results obtained in 1948, spray tests were carried on in 1949 at Clarksburg, California, Rocky Ford, Colorado, Mason City, Iowa, and at Chaska and East Grand Forks, Minnesota. All tests were sprayed a total of four times during the season.

The tests at Mason City, Chaska and East Grand Forks were set up as 6x6 Latin squares. The chemicals used were: Cooper oxide (spray grade), App-L-set, liquid phosphoric acid, milk and manganese sulfate. None of the treatments in any of these three tests was significantly different from the untreated check. It was noted that where *Cercospora* leaf spot was present the plots sprayed with copper oxide showed the lowest incidence of infection; however, in no case did this seem to affect yield.

The test conducted at Clarksburg, California, consisted of four treatments: milk, 17-7-0, milk—beets side-dressed with 17-7-0 at the rate of 75 pounds of plant food per acre, and the untreated check. There were no significant differences in this test.

The results of the test conducted at Rocky Ford are presented in Table 2.

As was the case in the other tests conducted in 1949 no significant differences were obtained in the Rocky Ford test.

Discussion

The explanation for the variation in results between the two years' tests cannot be explained. Chemicals which were common to both years' tests were all obtained from the same container with the exception of the milk treatment. It is very evident that before any conclusions can be made additional testing is necessary.

Summary

In an experiment conducted in 1948 in which various chemicals were sprayed on the foliage of beets significant increases in yield were obtained with milk, liquid phosphoric acid, quick root, and manganese sulfate.

Similar experiments made in 1949 did not substantiate the above findings.