Field Results In 1949 Following Row Treatment of Soil with Tetramethyl Thiuram Disulphide for Control of Blackroot of Sugar Beet Seedlings[1]

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In 1949 field tests were carried out in a number of locations in Kent county, the centre of the sugar beet-growing area of southwestern Ontario, but finally, for economy of time and effort and for greater precision in the obtaining of results, attention was concentrated on one six-acre field. This field, which was not too well under-drained, had a definite, recent blackroot history. The soil, a Brookston clay loam, was known to have produced some eight or nine crops of beets within the past 20 years and, in 1948, the seedling stand had been lost due to blackroot. A field more favorable for our tests could scarcely have been found.

The field was planted under ideal weather and excellent seed-bed conditions on May 5. For seeding operations and for deposition of fertilizer and fungicide-fertilizer mixtures an Oliver-Superior drill was used, the latter being drawn by a small tractor at a uniform rate approximating three miles per hour. The Oliver-Superior drill did not permit as ideal placement of the fertilizer as desired—namely, in the zone intervening between the seed level and the surface of the soil—but, of the drills available, it was closest suited to our purpose. Generally speaking, it deposited the fertilizer in an irregular pattern in the seed furrow above the seed. The weakness of this placement lay in the fact that a zone between the ground surface and the fertilizer level was left without fungicidal protection. U. S. 215x216 processed seed was planted to a depth of about $1^1/_4$ to $1^3/_4$in., *in* rows 28 in. apart, the rows being some 540 ft. long. No individual test comprised less than 16 rows running the full length of the field.

Every effort was made to apply the fungicide-fertilizer mixture in amounts approximating as closely as possible those which had given best results in the greenhouse experiments. Known weights of the various mixtures were added to the drill box and known distances were covered. Thus, it was easy to calculate the exact rates of application of any given material under test. Details as to materials used and rates of application are indicated in Table 1.

Cultural operations were carried out by the cooperating grower and by labor supplied by the Canada and Dominion Sugar Company, Chatham, Ontario. Prior to blocking and thinning and then subsequent to these opera-

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Table 1.—Effect of row treatment of different formulations containing T.M.T.D. on stand of seedlings and yield of mature beets

Treatment (per acre basis)	No. of seedlings per row (average) Pre-thinning counts	% Increase	Post-thinning counts	% Increase	Yield of Beets Tons per acre	Tonnage Increase
432 lb. 2-12-6	1519		331		12.62	
432 lb. 2-12-6 containing 4.3 lb. Arasan	2087		406		13.40	
218 lb. 2-12-6	1734		319		9.16	
218 lb. 2-12-6 containing 4.3 lb. Arasan	2336		370		9.52	
388 lb. 2-16-6	1467		293		9.04	
388 lb. 2-16-6 containing 2.6 lb. D-419	2122		330		11.24	
324 lb. 2-16-6	1192		260		8.26	
324 lb. 2-16-6 containing 3.2 lb. D-419	1923		314		9.81	
302 lb. 2-16-6	1562		262		7.90	
302 lb. 2-16-6 containing 4 lb. D-419	2273				11.30	

dons, we made counts of seedlings and compared the number in treated (fungicide and fertilizer) and in untreated (fertilizer alone) rows. Some 141,000 seedlings in more than eight miles of row were counted, the results being as shown in Table 1. Rows to be counted were in all cases selected at random before entering the field.

In mid-October the beets were lifted and topped in the prescribed manner. In our tests in previous years, sections of rows were harvested and weighed. This year yields from complete rows were weighed and compared. This involved the handling of about 25.5 tons of beets taken from 88 treated and untreated rows, representing an aggregate of nine miles of beet row. Both from the standpoint of magnitude and accuracy of the various operations involved, we believe that our field tests this year have not been surpassed by any similar experiment.

As Table 1 indicates, both pre- and post-thinning counts of seedlings showed increased stands in rows which had received the fungicide-fertilizer mixture. Especially in the pre-thinning counts the advantage lay definitely with D-419, an application of this formulation at 3.2 lb. per acre in one instance resulting in an increase in stand of 61.3% over corresponding check rows.

The increases *in* the early stands of seedlings in treated rows was reflected in increased yields of mature beets. Here again, as Table 1 clearly shows, D-419 gave results much more impressive than those obtained with Arasan. As a matter of interest, it may be stated that blackroot was worst in the section of the field where the D-419 tests were carried out. Since this is the first year that D-419 has been tested in the field, we have nothing on record with which to compare this year's results. However, in the case of Arasan, we can make broad comparisons between this year's and last year's field results. In 1948, in two widely-separated tests, Arasan applied at the rate of $3^3/_4$ lb. per acre in each gave increases of 1.5 and 1.3 tons per acre, respectively. This year, best results following the use of Arasan at 4.3 lb. per acre showed an increased yield of only .81 tons per acre.

Despite the generally successful use of Arasan-impregnated fertilizer, we are aware of instances in Ontario in which blackroot occurred in fields to which the protectant has been applied. There are a number of reasons why this occurred in 1949 and may occur again in the future. Chief of these, however, we believe, is improper placement of the protectant. We are insistent on the point that the seed should germinate in and grow up through soil impregnated with fungicide. We believe further that as the methods for field application approach more closely in precision those employed in the greenhouse, greater success in the control of the disease may be expected.

In closing, the content of the present paper may be recapitulated briefly as follows:

In field tests in which formulations of tetramethyl thiuram disulphide mixed with standard commercial fertilizer were added to field soils with a recent, definite blackroot history, non-thinned stands of seedlings receiving the T.M.T.D.-fertilizer mixture exceeded those receiving the fertilizer alone by from 34.7 to

61.3%. Furthermore, counts made subsequent to blocking and thinning operations showed gains for the treated rows over the untreated of from 8 to 35%. Such differences in early stands of seedlings have been reflected in increases of mature beets, which range from .36 to 3.43 tons per acre, in accordance not only with the rate of application of the chemical but also with the particular formulation of the latter.

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