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# PLANT DISEASES

## FURTHER EXPERIMENTS ON THE CONTROL OF EARLY BLIGHT OR TARGET SPOT OF POTATOES

By W. P. CASS SMITH, Government Plant Pathologist; M. HARDIE, Vegetable Instructor; B. N. LOWE,\* Vegetable Instructor

**T**HE effective control of Potato Early Blight or Target Spot by the use of Zineb fungicide (used in the proprietary form Dithane Z.78) has previously been reported in this Journal. It was shown in preliminary spray trials that the foliage blight caused by this disease is very destructive, and by the application of four Dithane sprays yields were increased in the order of 30 per cent., equivalent to approximately four tons per acre. Further experiments have now been conducted and the results indicate that even two applications of Dithane spray may, under conditions of severe blight attack, promote worthwhile higher yields.

Early blight or target spot caused by the fungus *Alternaria solani*, is a destructive disease of potatoes which in Western Australia is most prevalent in crops harvested in early summer and autumn. The disease attacks the foliage and as a result the tops are killed prematurely with consequent reduction in yield. Also, when crops are dug, contact between diseased tops and tubers may in certain circumstances lead to a tuber rot which develops in storage and is commonly referred to by growers as "storage disease." (For a fuller account of the symptoms and effects of the disease, see Leaflet No. 2056.)

Hitherto, early blight of potatoes has generally been recognised as a difficult disease to control, for the older copper fungicides such as Bordeaux mixture proved unsatisfactory. In 1952 however when spray trials with recently secured new fun-

gicides were conducted, very encouraging results were obtained with Dithane Z-78, a proprietary Zineb type spray (see Leaflet No. 2056). Subsequently this material was also found to be very effective for tomato early blight caused by the same fungus. (See Leaflets Nos. 2028 and 2105.)

The 1952 spray trials referred to were conducted in potato crops harvested in November-December, and four sprays of Dithane Z-78 were applied. The experiments now reported were conducted in the summer crop and were designed to compare the effects of two and four applications of Zineb spray. In Western Australia, the summer crop is planted in December-January, and is grown in drained swamps, or on land irrigated by furrow or sprinklers. The crop is harvested in autumn during April and May. Warm humid weather conditions ideal for rapid disease development

\* Resigned from the position of Vegetable Instructor in August, 1953.



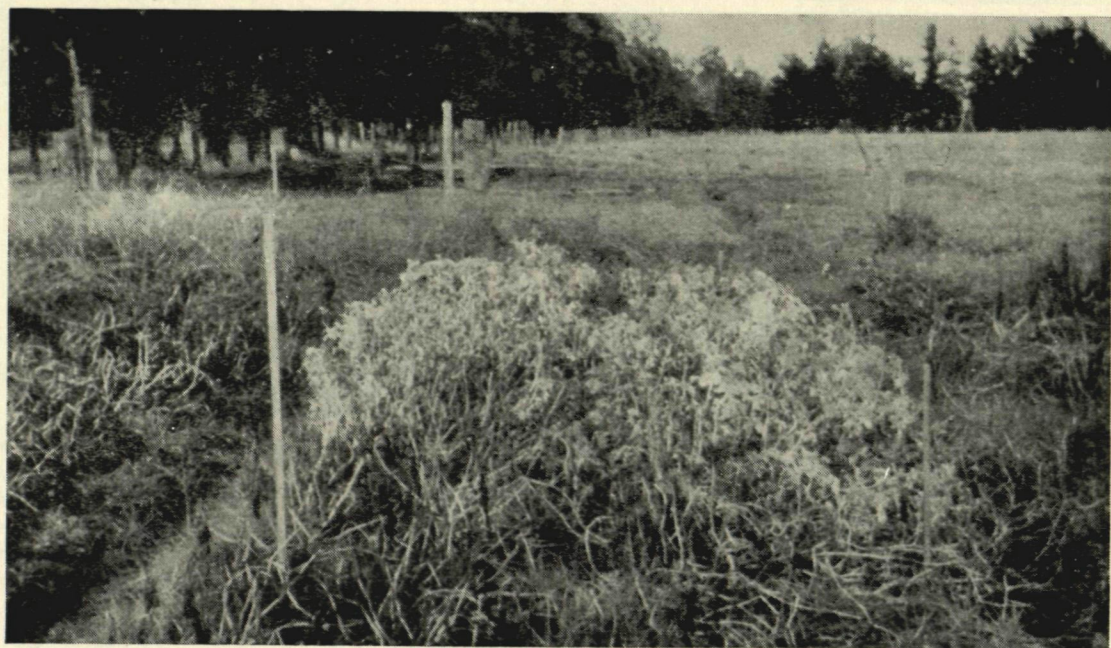


Fig. 1.—The photograph shows a small demonstration plot sprayed with Zineb in a potato crop grown by Mr. V. Morabito at Harvey. Note that the unsprayed plants surrounding the plot have been defoliated by early blight while the plants sprayed with Zineb have retained their foliage.

are commonly experienced as crops approach maturity, and in consequence the tops often become badly blighted.

Losses from tuber rot or "storage disease" are often very serious in the autumn harvested crop. This is because early digging which is often necessary to avoid flooding after heavy rains, facilitates tuber infection, and also because storage of the potatoes on the farm for several weeks before sale is necessitated by customary marketing practice.

Control of early blight attack on the foliage with consequent reduction in the amount of tuber rot is therefore of great importance in the profitable production of the summer crop.

#### Details of 1953 Spray Trials for Control of Early Blight.

Two experiments similar in design were conducted on the properties of (1) Messrs. T. H. Rose and Sons, Roelands; and (2) Mr. T. Talbot, Brunswick Junction.

A randomised block layout was used with six replications of four treatments (see table). Plots consisted of double rows each 40 links long with 10-link buffer (unsprayed) areas between each plot.

Spray Treatments.	Strength.	Average Plot Yield, 1st Grade Tubers.
(1) Control-unsprayed	.....	49.8 lb.
(2) Copper Oxchloride—4 applications	3½ lb. : 100 gals.	51.3 lb.
(3) Zineb (Dithane Z-78)—2 applications	2 lb. : 100 gals.	61.8 lb.
(4) Zineb (Dithane Z-78)—4 applications	2 lb. : 100 gals.	63.8 lb.

Least Difference for Significance at 99 : 1 level = 8.3 lb.

Least Difference for Significance at 19 : 1 level = 6.0 lb.

Unfortunately the experiment on Mr. Talbot's property was finally abandoned, for soil salinity developed and adversely affected crop growth. At Mr. Rose's property the first sprays were applied on 25th March, 1953, just before the tops met together in the rows, and when early blight was present in trace amounts only. Subsequent sprays were applied as follows:—

2nd spray, 2/4/53

3rd spray, 13/4/53

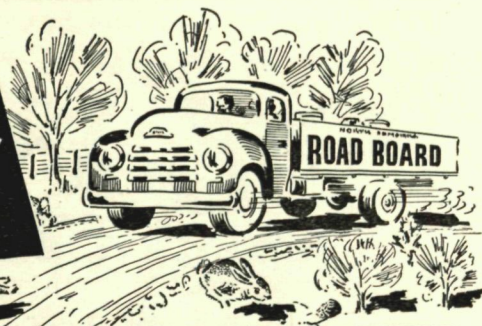
4th spray, 23/4/53

#### Results.

As in previous spray trials, Zineb was again the only fungicide to give effective control of early blight and resultant higher yields. Under the conditions of this ex-



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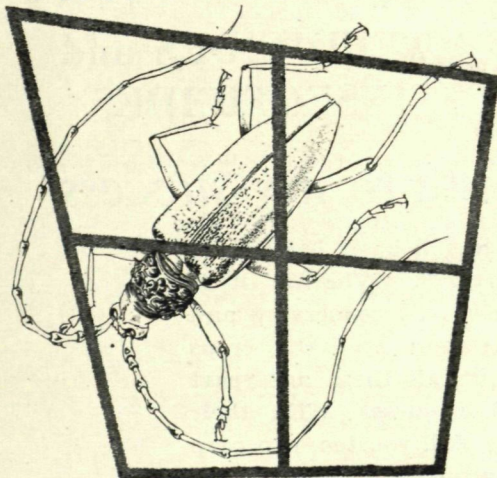


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periment, two applications of Zineb spray were as effective as four, and gave a yield approximately 25 per cent. higher than the control (unsprayed) plots (see table). However, from observations made during the progress of the experiment it seems probable that the plots sprayed four times with Zineb would have given a much higher yield had it not been for the occurrence of late frosts, and potato moth which finally infested these plots, as they contained the only green foliage remaining in the paddock. It is noteworthy that the yield of plots sprayed four times with a standard copper spray was no better than that of the unsprayed plots.

In addition to the above experiments, plots were established in the Manjimup and Harvey districts to demonstrate to growers the value of Zineb for controlling potato early blight. In most cases spectacular results were obtained (see Figs. 1 and 2).

### Recommendations for Potato Early Blight Control.

It is understood that the proprietary Zineb spray Dithane Z78 will shortly be available in commercial quantities in Western Australia, and will retail at approximately 15s. per lb. On this assumption, the following tentative recommendations for early blight control are made:—

1. While the disease is still present in trace amounts only and before the tops in adjacent rows meet, apply a Dithane spray at a concentration of 2 lb. in 100 gallons of water (or an equivalent concentration of other Zineb proprietaries which may become available). Thorough coverage particularly of the bottom foliage is necessary at this stage, and a minimum of 200 gallons of spray per acre will probably be required.

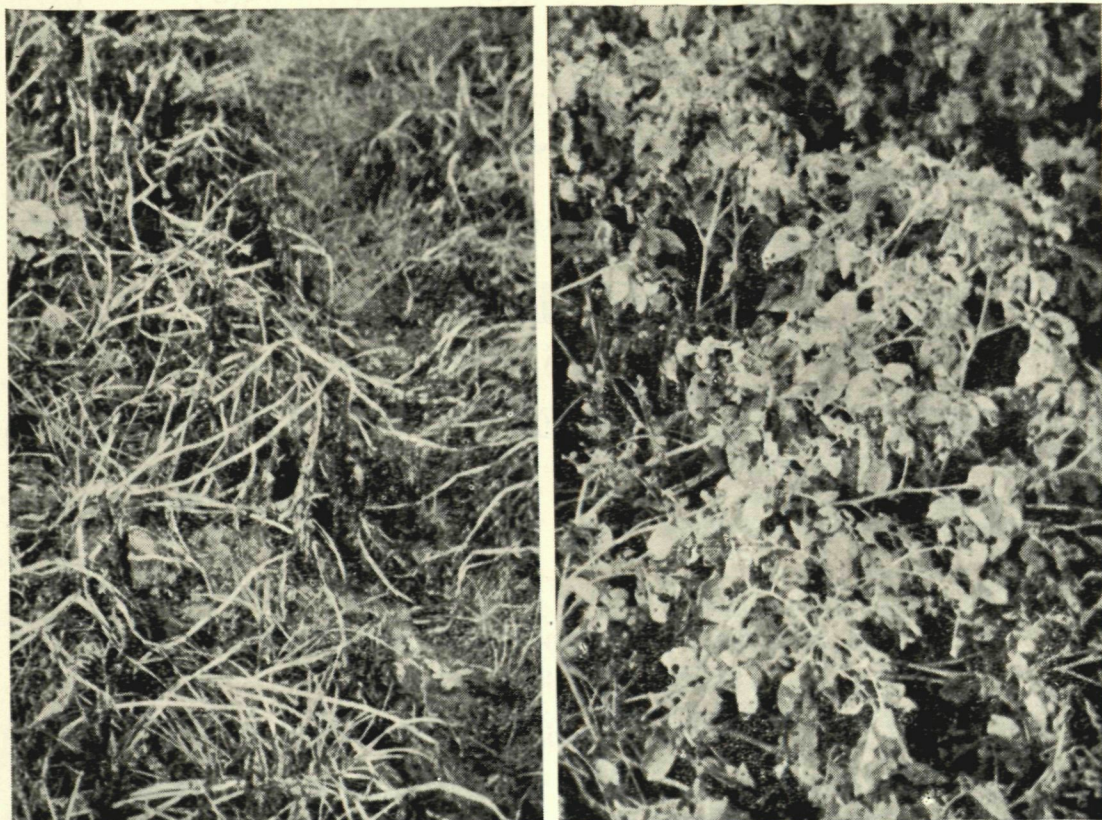


Fig. 2.—A closer view of unsprayed potato plants in Mr. V. Morabito's crop (left) compared with plants sprayed with Zineb (right).

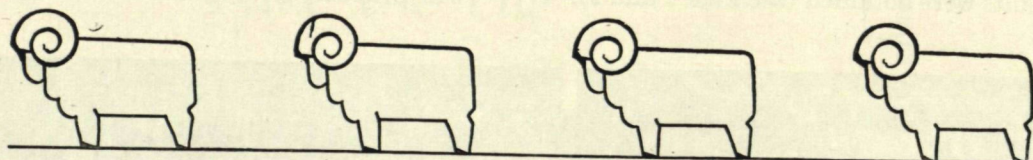


2. About 10-14 days later, apply a second spray at the same concentration, using approximately 300 gallons per acre.
3. Zineb type sprays are compatible with D.D.T. and most other insecticides, so that a combined spray for the dual control of early blight and potato moth, etc., may be used.
4. Where it is proposed to use a medium volume boom spray outfit, the amounts of Dithane applied per acre should be similar to those recommended in (1) and (2) above. Some experimentation will be required to determine the most suitable spray nozzles, and the minimum gallonage of spray per acre to secure adequate coverage. It is suggested that a minimum of 50 gallons per acre will probably be needed.
5. It is possible that some alteration in present planting methods may be necessary to facilitate the mechanisation of potato spraying operations.

Zineb containing dusts have not yet been tested here, but if they become available and are considered more convenient they are worthy of trial.

#### Acknowledgments.

Grateful acknowledgment is made to those growers who placed land and facilities at the disposal of the Agricultural Department for the conducting of these experiments and demonstrations. Thanks are also due to the W.A. Potato Marketing Board for its assistance and continued interest, and to Messrs. J. O'Neill and D. C. Fouracres, who helped to apply the sprays.



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