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STUDIES ON THE CONTROL OF LATE BLIGHT OF IRISH POTATOES ^{1/}

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Late blight has caused damage to Irish potatoes in certain parts of the world for more than a century, but was first reported in Alabama in 1940. Since that time it has occurred each year in the Gulf Coast areas of the State. The extent of damage has varied with weather conditions during the growing season. The disease is, and probably will continue to be, one of the most serious threats to profitable potato production in southwestern Alabama.

In 1945 an experiment was started at the Gulf Coast Substation, Fairhope, to determine if it is possible to control late blight and what treatments or practices if any would give the greatest net return. Since the results are from one year's test, no conclusions can be drawn or recommendations made. The results can be taken only as indications of what might be expected from the treatments tested.

Methods and Materials

Triumph was the variety used in the experiment. The materials included were selected because they had shown some promise of blight control in other potato-growing regions. Also, all of the materials were commercially available.

The experiment involved 10 sprays and dusts, and one check plot for measuring possible yield increases over no treatment. The treatments (Table 1) included different amounts of Dithane in combination with zinc sulfate and lime; yellow cuproicide dust, copper-hydro dust, yellow cuproicide spray, copper-hydro spray, tribasic copper dust, copper-lime dust, and Bordeaux spray.

With one exception, both spray and dust materials were first applied when the plants were 6 inches high. These treatments were repeated every 7 to 10 days until the potatoes were dug. Five applications were made. The one exception was the plot on which only one spray was used; it was applied five days after blight appeared in the experiment.

^{1/} One-year progress report, 1945.

^{2/} Gulf Coast Substation.

Table 1. Effect of Various Dusts and Sprays on the Control of Late Blight as Shown by Potato Yields, Gulf Coast Substation, 1945

Treatment	: Increase	: Approximate
	: due to	: cost per acre
	: treatment	: for materials ^{1/}
	<u>Bags</u>	<u>Dollars</u>
Dithane, 1½ qt. per 100 gal. plus ¾ lb. zinc sulfate and ¾ lb. lime	23.3	6.75
Dithane, 2 qt. per 100 gal. plus 1 lb. zinc sulfate and ½ lb. lime	22.3	9.00
Yellow cuprocide dust	20.3	10.85
Copper-hydro dust	18.0	10.50
Yellow cuprocide spray, 1½ lb. per 100 gal.	18.0	4.00
Copper-hydro spray, 4½ lb. per 100 gal.	17.0	4.00
Tribasic copper dust ^{2/}	14.3	7.00 (Est.)
Copper-lime dust: 30-70	10.3	7.00
Bordeaux spray: 8-6-100	5.7	3.75
None	----	----
Treatment 11 ^{3/}	0.0	1.80

- 1/ Labor cost and depreciation on machinery are not included. Insecticides can be added to any of the materials at a small additional cost.
- 2/ Proprietary compound prepared by the Tennessee Copper Company.
- 3/ Treatment 11 received only one spray of Dithane, 2 quarts per 100 gallons of water; zinc sulfate, 1 pound; and lime, ½ pound in 100 gallons. This spray was applied five days after blight appeared in the experiment.

The dusts were applied with a hand gun equipped with two nozzles. The sprays were applied with a power sprayer, which developed 300 to 400 pounds pressure. Good coverage was obtained with a boom having three nozzles per row. The rates per acre for each application were 100 to 125 gallons of spray, or 25 to 35 pounds of dust.

Results of Experiments

Blight was first found (April 14) on the rows that had received no treatment. At that time four of the five applications had already been made on the other plots. The potatoes were dug May 4, which was 90 days after planting and 20 days after blight appeared. At that time all plants on the untreated plot were dead from late blight. In contrast, all treated plots still contained some live foliage.

The yields obtained from the different treatments are given in Table 1. All materials controlled late blight. However, Bordeaux spray and copper-lime dust retarded the growth of the potatoes and delayed maturity.

The highest yields were obtained on the plots sprayed five times with Dithane but the differences were slight. Except for Bordeaux and copper-lime dust the materials were equally effective in this experiment. The most striking fact revealed by these results is that, in spite of the late appearance of blight and the unfavorable weather for blight development, yields were increased by 15 to 20 per cent when blight was controlled. This was more than enough to pay all costs of application.

Results obtained in treatment 11 and observations made in commercial fields indicate that materials and labor are largely wasted unless the first application is made when the plants are around 8 inches high and repeated at least every 10 days.

Since the data represent only one year's results, the yield increases might not be the same over a period of years. Weather conditions during the spring of 1945 were slightly better than average for the control of blight. Under more adverse weather conditions, the disease would be more severe. Thus, it would be expected that the yield from the untreated plot would be lower than that of the same plot in 1945. Or, in years of severe blight, treatments would be expected to give greater increases over no treatment than in seasons less favorable to spread of the disease.

For spraying or dusting to be effective, the plants must be entirely covered with material at each application. This requires around 100 gallons of spray per acre applied at 300 to 400 pounds pressure, or 30 pounds dust under sufficient pressure to be broken into a complete fog and applied under a hood.

Satisfactory coverage with spray cannot be obtained with less than three nozzles per row. One nozzle is placed at each side and the third nozzle above the row. They are so adjusted that the three cones of spray completely envelop the plants from the ground line up. As the plants grow larger, the nozzles must be set farther away.

Most spray pumps now in use in Alabama do not have the capacity to deliver enough spray at the required pressure when a 6- or 8-row boom with three nozzles per row is used. The number of rows should be reduced or the size of the pump should be increased.

Both spraying and dusting have advantages and disadvantages. The advantages of spraying are:

- (1) Better coverage can be obtained with a spray than with dust.
- (2) Sprays stick to the plant better than dusts and remain longer.
- (3) It may be done when too windy for dusting.

The advantages of dusting are:

- (1) Dusters are usually less expensive than sprayers.
- (2) Labor costs are less.

(3) Dusting equipment is lighter and may be used on wetter ground.

Practices that may help in producing potatoes under blight conditions include:

(1) Plant blight-free seed insofar as possible. If blighted seed are bought, all potatoes showing any sign of rot should be discarded and destroyed at the time of cutting seed pieces.

(2) Plant varieties that are less subject to blight. The Sebago is probably the most resistant variety in commercial production in Alabama. The Bliss Triumph and Katahdin are moderately resistant, while the Chippewa and White Rose have no resistance to the disease.

(3) Make all plantings within each community at as nearly the same date as possible. Blight usually starts in the earliest potatoes and spreads to later plantings, which may be killed before the crop is made.

(4) Avoid planting low, poorly drained areas. Infection usually begins in such places.

This experiment is to be continued over a period of years. The results will be published as they are obtained.