# SPRAYING CARROTS FOR CONTROL OF LEAF BLIGHTS IN 1961

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## Abstract

Five sprays with maneb at the rate of 2 lb per acre applied at 10-day intervals during July and August, in a replicated field experiment, gave good control of leaf blights of late carrot and higher yields of carrot roots (significant at 1% level). One application of maneb gave statistically significant control of leaf and petiole drop, a characteristic symptom of Alternaria blight.

## Rksumk

Cing pulvérisations avec du manebe appliqué à tous les dix jours durant juillet et août, à raison de 2 livres à l'acre, ont assurk une répression des brûlures foliaries de la carotte et permis un meilleur rendement, Les rksultats des parcelles traitées ktaient significativement différents des rksultats obtenus dans les parcelles tdmoins. De plus, une application de manebe prkvient la chute des pktioles de la carotte, symptôme caractéristique de la brûlure alternarienne,

## Introduction

The leaf blights of carrot caused by Alternaria dauci (Kühn) Groves & Skolko, and Cercospora carotae (Pass.) Solheim, have become increasingly common in the muck soils of the Montreal area during the past 2 years (3, 4). These diseases cause considerable loss in commercial plantings whether they occur singly or together,

Succesful control of these diseases by the use of Bordeaux mixture and fixed copper compounds was reported from Ohio as early as 1944 (9). In the Montreal area, as in many other carrot growing areas, the fungicides now preferred are maneb and zineb. However, repeated spraying with these fungicides has failed to give satisfactory control in many muck soil areas, Experiments were started in 1961 to obtain additional information on the effectiveness of maneb and a better timing of fungicidal applications. This paper reports the results obtained in the first year.

## Symptoms

The symptoms of Cercospora blight are similar to and often confused with those of Alternaria blight, although differences in symptoms have been described in many papers (1, 2, 7). Cercospora lesions are usually marginal although any part of the leaf or petiole may be attacked. Spots are nearly circular and usually have a light tan-colored center with a darker border,

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Lesions on petioles are usually elongate and often have a more or less light-colored center, as shown in Figure 1. Under moist conditions, lesions induced by Cercospora may be dark colored.

Lesions produced by Alternaria appear first as irregular dark-brown to black spots, surrounded by yellowish areas, near the margins of the leaflets. Usually the leaves dry up, turn brown or black, die, and finally drop off. This gives the field a seared appearance, as illustrated in Figure 2.

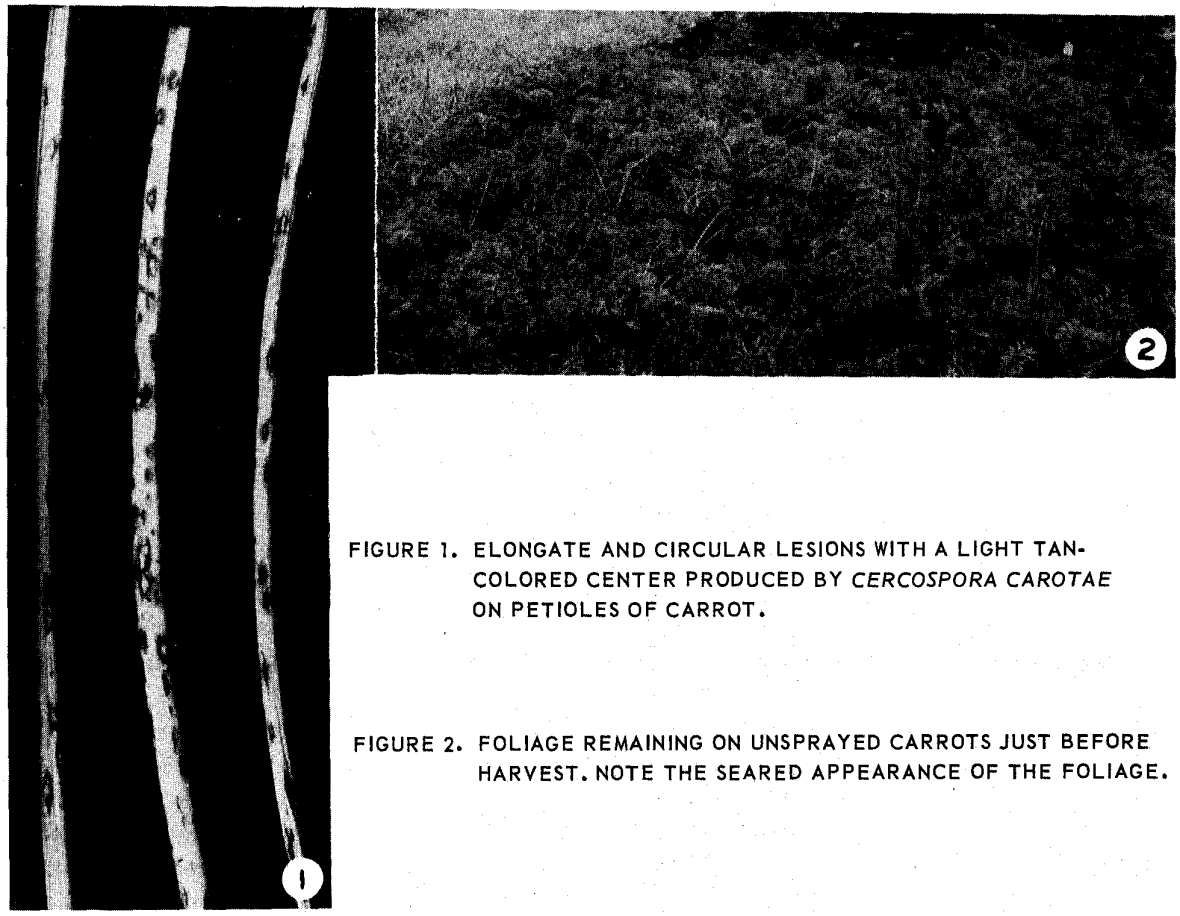

FIGURE 1. ELONGATE AND CIRCULAR LESIONS WITH A LIGHT TAN-COLORED CENTER PRODUCED BY *CERCOSPORA CAROTAE* ON PETIOLES OF CARROT.

FIGURE 2. FOLIAGE REMAINING ON UNSPRAYED CARROTS JUST BEFORE HARVEST. NOTE THE SEARED APPEARANCE OF THE FOLIAGE.

The two diseases usually occur together. C. carotae appears earlier in the season than Alternaria and is most severe on the young leaves. Infection builds up when the plants are relatively young. A. dauci is more pathogenic on old leaves and does not become prevalent until the plants approach maturity (2).

## Materials and Methods

The experiment was carried out on muck soil at the Research Substation at Ste-Clotilde, Que. Carrots of the variety Gold Pak were seeded on June 8. Randomized plots consisting of 8 rows, each 60 feet long, were sprayed with maneb at the rate of 2 lb per acre. Each treatment was replicated 4 times. The treatments were as follows:

Treatment 1 - Control
" 2 - One application of maneb
" 3 - Two applications of maneb
" 4 - Three applications of maneb
" 5 - Four applications of maneb
" 6 - Five applications of maneb

Fungicidal applications were started on July 6, and repeated at 10-day intervals during July and August, until about 4 weeks before the crop was harvested on September 20. Just before harvest, 35 plants were picked at random in each plot, and the number of petioles attached to each crown was determined, The petioles were cut 4 inches from the crown and the number of lesions was counted on each petiole. The roots were harvested and the yield determined for each treatment. The results obtained were evaluated statistically and are presented in Table 1.

Table 1. Control of Alternaria and Cercospora blights of carrot in 1961

| Treatment | Number of lesions | Number of petioles | Yield (lb) |
|---|---|---|---|
| Control | 824(1) | 180 | 233 |
| 1 application | 737 | 222 | 285 |
| 2 applications | 668 | 224 | 281 |
| 3 applications | 351 | 238 | 285 |
| 4 applications | 142 | 235 | 286 |
| 5 applications | 66 | 225 | 328 |
| LSD 0.01 | 652 | 38 | 6 |

(1) Each figure is the mean of 4 replicates.

## Results and conclusions

Little disease was noticeable in the control plots at the end of August, but shortly after this the plots which were not sprayed began to show characteristic symptoms of foliar blights, By mid-September, the difference in color and density of the foliage on the sprayed and unsprayed plots was very striking. The results indicate that 4 applications of maneb are necessary for effective control of Alternaria and Cercospora lesions on carrot, A fifth application of fungicide did pot give significantly better control of the diseases but gave higher yields of commercial roots, One application of fungicide significantly increased yields of carrot roots, and gave significant control of leaf and petiole drop.

The results indicate that spraying carrots with maneb may be beneficial, especially if weather conditions are favorable for infection by Alternaria and Cercospora blights. Similar results were obtained in Ohio, where an increase in yield of 66. 7 per cent followed 4 applications of Bordeaux mixture (8).

The information obtained in the first year of this experiment justifies further work on the problem, It is hoped that subsequent experiments, and the results of current epidemiological studies (5, 6), will permit better timing of treatments and more effective and economical control of foliar blights of carrots.

Table 1. Storage rots in the first and second pickings of Stokesdale tomatoes from spray plots at the end of 5 weeks in storage at 53°F in 1960.

| Fungicide per 100 gallons | Total per cent rots | | Per cent rots caused by C. coccodes | | Per cent rots caused by A. tenuis | |
|---|---|---|---|---|---|---|
| | 1st | 2nd | 1st | 2nd | 1st | 2nd |
| Maneb, 2 lb. | 44 ab[2] | 33 de | 30 a | 7 a | 12 abcd | 21 a |
| " 1 lb. + thiram, 1 lb. | 29 abc | 53 bcd | 15 a | 19 a | 13 abcd | 23 a |
| " 1 lb. t Dyrene, 1 1/4 lb. | 21 c | 34 de | 5 a | 13 a | 12 abcd | 12 a |
| " 2 lb. t thiram, 2 lb. | 19 c | 39 de | 13 a | 7 a | 5 cde | 22 a |
| Zineb (factory mix), 2 lb. | 34 abc | 41 cde | 12 a | 9 a | 17 ab | 16 a |
| " 2 lb. + Dyrene, 1 3/4 lb. | 34 abc | 62 abc | 22 a | 17 a | 8 bcde | 24 a |
| " 1 lb. t thiram, 1 lb. | 17 c | 39 cde | 5 a | 10 a | 9 abcde | 12 a |
| Zineb (tank-mix nabam, 1 qt. + 3/4 lb. zinc sulphate) | 50 a | 63 abc | 17 a | 12 a | 18 a | 35 a |
| " half strength t thiram, 1 lb. | 34 abc | 28 c | 24 a | 9 a | 2 e | 9 a |
| " half strength t Dyrene, 1 1/4 lb. | 25 bc | 66 ab | 20 a | 18 a | 3 de | 17 a |
| " full strength t Dyrene, 1 3/4 lb. | 21 c | 43 bcde | 14 a | 10 a | 7 cde | 17 a |
| " full strength t thiram, 2 lb. | 16 c | 48 bcde | 8 a | 18 a | 7 cde | 20 a |
| Ziram, 2 lb. alternating with Bordeaux 10-7-100 | 38 ab | 50 bcde | 27 a | 15 a | 10 abcde | 29 a |
| Blitox[1], 3 lb. | 30 abc | 50 bcde | 14 a | 16 a | 13 abcd | 26 a |
| Control | 50 a | 77 a | 27 a | 21 a | 15 abc | 21 a |

[1] 50% copper as the oxychloride.

[2] Small letters indicate Duncan's Multiple Range grouping of treatments which do not differ significantly at the 5% level.