CYPREX: A SUPERIOR CONTROL FOR SHOTHOLE DISEASE OF CHOKECHERRY[1]

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Introduction

The shothole disease of chokecherry seedlings has seriously threatened nursery stock in past years. Chokecherry was used extensively in shelterbelt plantings of 1936 to 1942, and on the basis of its performance is considered to be an adaptable, desirable plant for providing a low, dense component of windbreaks. In Nebraska the chokecherry is increasing in importance as a source of wildlife food, and serves a minor role in ornamental plantings. Under conditions favorable to disease development, outbreaks of the shothole disease, caused by the ascomycetous fungus, Coccomyces lutescens, have severely reduced the marketability of nursery seedlings, in some places resulting in total loss of first-year plantings.

Infected leaves first show chlorotic lesions, which later become necrotic and fall out leaving the leaf with a typical shothole appearance (fig. 1). Under more severe infections the typical shothole aspect does not appear; rather, the coalescence of closely spaced lesions produces a general blighting of the leaf and subsequent defoliation.

Figure I.--Typical shothole symptoms on first-year chokecherry seedlings.

In the spring and summer of 1958 a spray program was designed to test the effectiveness of several fungicides in controlling this disease.

Methods

First-year chokecherry seedlings, seeded in the fall of 1957 at the Plumfield Nurseries in Fremont, Nebr., were sprayed with eight fungicides. The fungicides and

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dosages used are given in table 1. Four replications were drawn from a randomized block for each treatment. The first spraying was conducted May 11, 1958, 2 weeks after the seedlings had emerged. The last spraying was conducted September 3. A total of nine sprayings with the prescribed fungicides were made, following at approximately 2-week intervals between May 11 and September 3. The first three sprayings were applied with a Hudson knapsack sprayer at 20-25 pounds per square inch (p.s.i.). The remaining sprays were applied using a Century pressure sprayer at 200-250 p.s.i. to provide complete coverage of the increasing foliar surface.

Table 1.--Fungicides screened for control of chokecherry shothole disease

Fungicide	Manufacturer	Active ingredient	Form	Dose per 100 gallons
Cyprex.....	American Cyanimide Co.	Dodecylguanidine acetate 70 percent	Wettable powder	1 pound.
Maneb (Manzate)..	DuPont Co.	Maneb (Manganese ethylene bix-dithio carbamate) 70 percent	do	2 pounds.
Actispray (Actidione)....	Upjohn Co.	Actidione (B-(2-(3.5-dimethyl)-2-hydroxyethyl)-glutarimide) 7.7 percent	Tablet	2 parts per million.
Zineb (Parzate)..	DuPont Co.	Zineb (Zinc ethylenebis-dithiocarbamate) 65 percent	Wettable powder	2 pounds.
Captan (Orthocide 50).....	California Spray Chemical Corp.	Captan (N-trichloromethyl-mercapto-4-cyclohexene-1, 2-dicarboximide) 50 percent	do	4 pounds.
Dyrene.....	Chemagro Corp.	2,4-Dichloro-6-(O-chloro-aniline)-triazine 50 percent	do	2 pounds.
Puratized agricultural spray.	Gallowhur Chemical Corp.	Phenyl mercury triethanol-ammonium lactate 7.5 percent	Liquid	1 pint.
Bordeaux mixture.	Locally prepared	$CuSO_4$ and lime	Powders	5 pounds, 7 pounds.

At times throughout the duration of the spraying, readings were taken on the various aspects of the disease. Five readings each were taken on incidence and severity, four on defoliation, and one on plant vigor. Scales were prepared for each disease aspect to be considered, and are as follows:

Incidence

0--No infection or trace.
1--Only a few older leaves spotted.
2--All older leaves spotted.
3--All but newest leaves spotted.
4--All leaves spotted.

Severity

0--No spotting or trace.
1--Light spotting.
2--Moderate spotting, no blighting.
3--Heavy spotting, some blighting.
4--Extensive blighting.

Defoliation

0--No defoliation.
1--Light defoliation.
2--Moderate defoliation.
3--Heavy defoliation, lower stems bare.
4--Complete defoliation.

Vigor

1--Above 18 inches in height.
2--12-18 inches in height.
3--6-12 inches in height.
4--Below 6 inches in height.

Readings were taken in each replicate plot, and the readings of the four replicates for each treatment were averaged to arrive at a single index rating for each fungicide.

Results

Readings for the treatments and the control are presented in table 2. Concerning "incidence," "severity," and "defoliation," for which several readings were taken, only the first and last readings are presented. The single reading for "vigor" is also presented. In addition to the disease ratings, the rank of each treatment denoting the order of its effectiveness in comparison to that of the other treatments is also given.

Table 2.--Index ratings and comparative rankings of spray treatments[1]

Treatment	Incidence		Severity		Defoliation		Vigor Sept. 8	Overall rating Sept. 8[2]
	June 30	Sept. 8	June 30	Sept. 8	June 30	Sept. 8		
Cyprex.....	1.00 1	2.40 1	0.93 1	1.08 1	0.25 1	0.00 1	1.25 1	4.73
Zineb.....	2.43 2	3.58 2	2.25 3	3.35 2	0.68 2	2.25 2	2.15 2	11.33
Actispray.....	2.68 4	3.85 4	2.18 2	3.35 4	0.83 4	3.10 5	2.58 3	12.88
Maneb.....	2.83 6	4.00 5	2.60 5	3.25 2	1.33 5	2.75 3	3.08 5	13.08
Puratized agricultural spray.	2.43 2	3.83 3	2.50 4	3.65 5	0.75 3	2.85 4	2.75 4	13.08
Dyrene.....	2.75 5	4.00 5	2.83 6	4.00 8	1.75 6	4.00 8	3.65 7	15.65
Captan.....	3.00 7	4.00 5	3.08 7	3.65 5	2.58 7	3.75 6	3.50 6	14.90
Bordeaux.....	3.40 8	4.00 5	3.33 8	3.75 7	3.08 8	3.85 7	3.68 8	15.28
Check.....	3.40 8	4.00 5	3.48 9	4.00 8	3.83 9	4.00 8	4.00 9	16.00

[1] Lowest index indicates best disease control. First figure for each date is index rating, second figure is comparative rank.

[2] Overall disease rating (last column) equals sum of September 8 readings.

Cyprex was by far the most effective of the fungicides tested. Throughout the spraying period Cyprex-treated seedlings showed a minimum of disease in all aspects concerned. By mid-September they averaged nearly 18 inches in height and had lost no leaves because of disease, whereas the checks were less than 6 inches in height and were completely defoliated (see fig. 2).

Figure 2.--The tall plants with heavy foliage are Cyprex-treated chokecherries. The check plants in the foreground are do foliated and small.

Zineb (Parzate), maneb (Manzate), puratized agricultural spray, and actispray (Actidione) may be placed in a group giving moderate control, while Dyrene, captan (Orthocide) and bordeaux mixture may be classified as giving little or no control. Control plants were a total loss with no commercial value.

CAUTION: In handling the chemicals listed, follow directions and heed precautions given by the manufacturer.
Mention of any chemical company or product does not imply endorsement by the U.S. Department of Agriculture.