INFLUENCE OF ORCHARD FUNGICIDES ON GLOEOSPORIUM ALBUM ROT AND STOWAGE SCAB OF APPLES[1]

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Abstract

Excellent control of a storage rot of apples, caused by Gloeosporium album, was obtained with an orchard spraying program of captan in the pre-cover followed by 3 regular and 2 late cover sprays of captan or a mixture of captan and zineb. Dyrene gave good control without late cover sprays. Some control was obtained when captan or the mercurial fungicides, Phelam and Phix, were used in the pre-cover and followed by 3 regular captan cover sprays.

Control of storage scab of apples, caused by Venturia inaequalis, was obtained with captan in the pre-cover followed by 3 regular and 2 late cover sprays of zineb or a mixture of captan and zineb. A regular schedule of dodine without late cover sprays gave excellent control of storage scab.

Introduction

A rot of apples, often referred to as bitter rot or ripe spot, caused by Gloeosporium album Osterw., is an important cause of fruit loss of stored apples in Nova Scotia. In many apple growing areas the anthracnose fungus, Gloeosporium perennans Zeller & Childs, is usually the more common species of Gloeosporium causing storage rots but this organism has not been found in Nova Scotia. Recently In Nova Scotia Eaves et al. (2) found that pre-cover sprays of phenyl mercury acetate or seasonal applications of captan resulted in less rot by G. album than did ferbam, glyodfn or sulphur paste. A lime sulphur-colloidal sulphur schedule has been reported (8) to give no control of G. album but thiram or captan continued for 3 cover sprays gave good control. Brooks (1) reported satisfactory control of G. album and G. perennans with phenyl mercury chloride fallowed by captan cover sprays: Marsh et al. (6) obtained better control with late cover sprays of captan or ziram than with glyodin. Several other workers (3, 4, 5, 7) have reported some control of G. album and G. perennans with late cover sprays of captan.

This paper shows the effect of orchard fungicides on the development in storage of apple rots caused by G. album and some results are given of their effectiveness against storage scab caused by Venturia inaequalis (Cke.) Wint.

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Materials and Methods

The apples used in this work were from a young orchard located near Kentville, N. S., in which fungicide trials were carried out in 1957 and 1959. In 1957 the orchard was divided into 2 parts, one being used to test apple scab fungicides in a protectant schedule and the other for tests on eradicant or post-infection sprays. Each part was laid out in 2 blocks and the treatments were randomized In each block. The protectant plots received 5 pre-cover (April 29; May 9, 16, 27; June 6-7) and 3 cover (June 17-19, 26-28; July 9-10) sprays. A captan plot in one block received 2 extra cover (July 31, August 29) sprays. The eradicant plots received 3 pre-cover (May 14, 28; June 10) and, except for dodine, the cover sprays were applied as in the protectant schedule. Dodine was applied as an eradicant in the cover sprays on June 19, 28 and July 11.

In 1959 all fungicides were applied in a protectant schedule. The orchard was divided into 2 blocks with the treatments randomized in each block. Except for one dodine treatment, where the sprays were applied about 12 days apart giving a total of 7 applications with the final one on July 20, the plots received 5 pre-cover (May 7-8, 14-15, 21-22; June 1-2, 11-12) and 3 cover (June 22-23; July 2-3, 13-15) sprays. In one block 3 captan plots received extra cover sprays on July 27 and August 17.

The sprays were applied dilute with a hand gun and the trees were sprayed to run-off. The fungicides used were:

Phelam, phenyl mercury dimethyl dithiocarbamate, 3% (F.W. Berk & Co., Ltd., London, England)

Phix, phenyl mercury acetate, 22% (Chemley Products Co., Chicago, Ill.)

Dodine (Cyprex) n-dodecyl guanidine acetate, 65% (Cyanamid of Canada, Ltd., Toronto, Ont.)

Captan (Captan 50-W), N-(trichloromethylthio)-4-cyclohexene-1, 2-dicarboximide, 50% (Stauffer Chemical Co., New York, N.Y.)

Dichlone (Phygon XL), 2, 3-dichloro-1, 4-naphthoquinone, 50% (Naugatuck Chemicals, Elmira, Ont.)

Glyodin (Crag Fruit Fungicide 341), 2-heptadecyl-2-imidaaoline acetate, 34% (Green Cross Insecticides, Montreal, Que.)

Dyrene, 2,4-dichloro-6-(o-chloroanalino) triazine, 50% (Chemagro Corporation, Kansas City, Ma.)

Zineb (Parzate), zinc ethylene bisdithiocarbamate, 50% (Du Pont Co. of Canada, Ltd., Montreal, P.Q.)

In 1957 one bushel of unblemished McIntosh apples from each plot were stored at 32°F and removed for examination after 210 days. In 1959 one

bushel of McIntosh and one of Gortland apples from each plot were stored at 38°F and examined after 215 days. Records were made of the number of fruit showing *G. album* rot and storage scab, In calculation of the percentage of fruit with rot or scab every affected fruit was included whether it had one infection or many. When spores were not present on the rotted areas for identification of the causal organism, isolations were made on an agar medium.

Results and Discussion

The 1957 results are presented in Table 1 and those from 1959 are in Table 2. Except for the captan plots, where the effect of extra cover sprays was obtained, the data are the average of 2 replicates,

Table 1

Influence of orchard fungicides on *G. album* rot of McIntosh apples - 1957

Fungicide and rate per 100 gallons		Percent rot
Pre-cover	Cover	
Eradicant Schedule		
Phelam, 1 lb.	Captan, 1 1/2 lb.	3.2
Phix, 1/4 lb.	Captan, 1 1/2 lb.	4.9
Dodine, 1 lb.	Dodine, 1 lb.	7.3
Protectant Schedule		
Captan, 2 lb.	Captan, 1 1/2 lb.*	0.0
Captan, 2 lb.	Captan, 1 1/2 lb.	4.9
Dichlone, 1/2 lb.	Zineb, 2 lb.	7.0
Zineb, 2 lb.	Zineb, 2 lb.	7.5
Dodine, 1 lb.	Dodine, 1 lb.	9.0
Glyodin, 3/4 qt. + Phix, 1/8 lb.	Glyodin, 1 qt.	13.4
Dyrene, 2 lb.	Dyrene, 2 lb.	2.4

* 2 extra cover sprays

Table 2
Influence of orchard fungicides on G. album rot and storage scab of apples - 1959

Fungicide and rate per 100 gallons		Percent rot and scab			
		McIntosh		Cortland	
Pre-cover	Cover	Rot	Scab	Rot	Scab
Captan, 2 lb.	Captan, 1 1/2 lb, *	0.0	9.1	0.0	10.9
Captan, 2 lb.	Captan, 1 1/2 lb.	1.6	71.8	4.7	29.1
Captan, 2 lb.	Zineb, 2 lb.*	3.8	0.0	0.7	0.0
Captan, 2 lb.	Zfneb, 2 lb.	4.3	26.7	3.8	11.3
Captan, 2 lb.	Captan, 1 lb.+Zineb, 1 lb.*	0.5	0.0	0.0	0.0
Captan, 2 lb.	Captan, 1 lb.+Zineb, 1 lb.	3.6	93.2	1.5	11.1
Dodine, 3/4 lb.[a]	Dodine, 3/4 lb.[a]	3.1	1.8	0.4	0.0
Dodine, 3/4 lb.	Dodine, 3/4 lb.	5.0	0.0	3.5	2.1
Dodine, 1/2 lb.	Dodine, 1/2 lb.	11.3	24.2	3.8	0.3
Dichlone, 1/2 lb.	Dichlone, 1/4 lb.	6.8	59.5	4.2	24.4
Glyodin, 1 1/2 qt.	Glyodin, 1 qt. ,	5.1	48.5	6.7	8.4
Glyodin, 1 qt.	Glyodin, 3/4 qt.	10.6	67.7	7.1	14.5

*2 extra cover sprays
[a] Sprays 12 days apart

The results for 1957 show the value of the extra captan cover sprays for controlling G. album fruit rot. This is in agreement with the results of other workers (3, 4, 5, 7). The results with Dyrene are interesting in that it held the rot to a low level without extra applications. Captan without extra cover sprays, or the mercurial fungicides, Phelam and Phix, followed by captan also gave some measure of control. The results with glyodin are similar to those of other workers (2, 6) who found that it was not as effective as captan.

In 1959 (Table 2) the extra captan cover sprays again gave complete control of G. album rot in both apple varieties. Zineb as a cover spray was less effective but the mixture of captan and zineb gave almost complete control, The results with dodine suggest that extra cover sprays at the 3/4 lb. rate might be very effective. There was less rot in the 12-day treatment which received its final cover spray on July 20 than in the regular dodine treatment where the final spray was applied 5-7 days earlier. The results

with glyodin, except at the higher rate on McIntosh, agree with those of 1957.

Storage scab did not show up on the 1957 crop but in 1959 it was possible to compare the effectiveness of the various treatments for the control of this disease. The results in Table 2 show dodine at the 3/4 lb. rate to be very effective. Without extra cover sprays all other treatments were relatively ineffective. Where extra cover sprays were applied zineb and the mixture of captan and zineb gave complete control of storage scab. Without extra cover sprays zineb was much more effective than the ,mixture of captan and zineb or captan alone,

The mixture of captan and zineb with extra cover sprays in **July** and August appears to be an excellent spray for the control of both G. album rot and storage scab of apples.

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