Florida Foliation Grower

Vol. 9 No. 1
January, 1972

Cylindrocladium Control on Azalea -
Dips, Drenches and Sprays

Arthur W. Engelhard

The Cylindrocladium disease (Cylindrocladium spp.) causes serious losses in all phases of azalea production. Previous experiments to control the Cylindrocladium disease by drenching potted plants, showed Benlate (benomyl 50W) as the only chemical among 16 tested that provided 100% disease control.

The objectives of these experiments were to investigate the efficacy of Benlate 50W and another chemically similar compound, Mertect (thiabendazole 60W) in controlling Cylindrocladium disease by 1) soaking cuttings, 2) drenching cuttings during propagation and 3) foliage sprays and drenches on potted plants. Several other promising fungicides were also evaluated for disease control and phytotoxicity on the foliage of potted plants.

MATERIALS AND METHODS - Three experiments were conducted, two during propagation of cuttings under intermittent mist in a commercial greenhouse and the third on potted plants in a saran cloth house.

In the first propagation experiment (drench test) 20 cuttings each of Rhododendron obtusum (Lindl.) Planch cultivars 'Dorothy Gish', 'Erie', 'Gloria', 'Improved Redwing', and 'Dark Rose Queen' were used for each treatment. The cuttings were stuck July 14, 1970 in Jiffy Mix (1:1 mixture of shredded sphagnum peat moss and vermiculite plus added nutrients) that had been infested

1Associate Professor (Associate Plant Pathologist), University of Florida, IFAS, Agricultural Research and Education Center, Bradenton, Florida 33505.

Florida Agricultural Experiment Stations Journal Series No. 3919.
The author wishes to express appreciation to Messrs. Don Hamilton and Ray Staaldunen of the Pan American Plant Company for providing azalea cuttings, facilities and assistance and to Dr. E. K. Sobers, University of Georgia, for verification of the isolate of Cylindrocladium scoparium.

<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylindrocladium Control on Azalea - Dips, Drenches and Sprays</td>
<td>1</td>
</tr>
<tr>
<td>1972 Foliage Weed Control Survey</td>
<td>6</td>
</tr>
</tbody>
</table>
with Cylindrocladium (a conidial suspension of C. scoparium Morgan). Individual treatments were placed in new cypress-wood flats and placed on a greenhouse bench under intermittent mist. The treatments were Benlate 50W and Mertect 60W, each at 1.0 lb and at 0.5 lb/100 gal, and water. They were applied at 1 pt/ft² beginning on July 14, 1970 and repeated weekly. Evaluations were made September 25, 1970.

In the second propagation test (cutting soak) 20 cuttings of the cultivars White Gish, Scarlet Chimes and Hexe were used for each treatment. On July 24, the cuttings were dipped in a suspension of the disease causing organism (C. scoparium) for 10 minutes, followed by a 10 minute dip in the respective fungicide treatments. They were then stuck in Jiffy Mix and placed under intermittent mist. The chemicals and rates used were the same as those utilized in the drench test. Water was used for the control treatments. The cuttings received no additional treatments. They were evaluated on September 25, 1970.

The cuttings in both experiments were dipped in Hormonex No. 2 rooting compound before sticking. Separate supplies of rooting compound were used for each treatment. The summer temperatures in the greenhouse during the experiments ranged between 75 and 106 F.

Plants were rated (Root Index) for root development and disease control on a 0 to 3 scale. The condition of the plants falling into the 0 category ranged from dead to severely decayed and had no living roots. Cuttings with a rating of 1 had a few scattered roots and little or no decay. Ratings of 2 and 3 indicated the roots were plentiful and developed completely around the stem to form a "ball" (the Jiffy Mix and the roots did not separate easily). The roots rated 2 were less than 20 mm long and the roots rated 3 were over 20 mm long. There was no decay on the plants rated 2 and 3. Only plants rated 2 and 3 were considered to be acceptable commercially.

The Root Index (Table 1, 2) was the sum of the number of cuttings in each category times the rating.

The third experiment consisted of pot drenches and foliage sprays conducted on 2-pinch liners potted in peat in 6 inch plastic pots on March 1, 1970. The four drench treatments were applied every six weeks and the foliage sprays were applied weekly for five months beginning on May 22, 1970.

The drench treatments were Benlate 50W at 0.5 lb/100 gal, Mertect 60W at 0.5 lb/100 and Panogen 15 (cyanomethylmercuri) guanidine 2.2%) at 30 fl oz/100 and tap water. Eight fluid ounces were applied to each pot at each application. The foliage sprays, applied with a hand boom at 50 psi were Benlate 50W at 0.75 lb/100, Mertect 60W at 0.75 lb, Daconil (tetrachloroisophthalonitrile) 75W at 1.5 lb, Dithane M-45 (zinc ion plus maneb 50W) at 1.5 lb, Panogen 15 at 25 fl oz and tap water. Cylindrocladium wilt and leaf spot were present among the stock plants from which the test plants were selected. No artificial inoculation was made. The test plants were observed weekly for foliage injury. They were evaluated for root development on July 2 and October 2 by knocking each plant out of the pot and rating the percent of the surface of each ball that was covered with roots.
RESULTS - Benlate 50W at 1.0 lb/100 was the only commercially acceptable treatment in both the cutting drench and cutting soak experiments. No disease was observed on the plants and the percent of usable cuttings and the Root Index exceeded that of the uninoculated treatment in both tests (Table 1,2). This demonstrated good disease control, a lack of phytotoxicity and also possibly other beneficial effects from the use of Benlate 50W at 1.0 lb/100. The cuttings maintained a good green color throughout the test. In both propagation experiments, Benlate 50W at 0.5 lb, Mertect 60W and the inoculated control had an unfavorable combination of decayed plants, low Root Index, and low percent of commercially usable cuttings that made the treatments unacceptable. The disease organism, C. scoparium, was recovered from some cuttings of all treatments except Benlate 50W at 1.0 lb/100.

In the third experiment in which pot drenches and foliage sprays were applied, not enough new disease developed to get a meaningful rating on disease control. Of the five fungicides applied to the foliage only Benlate 50W and Panogen 15 caused injury. After two sprays with Benlate, necroses varying from small (1-2 mm diameter), necrotic spots to general necrotic areas occurred on the older foliage of both cultivars. This reaction, which was present on all plants sprayed with Benlate on each of the four drench treatments, did not occur again during the entire five-month spray period. Foliage on the plants sprayed with Panogen 15 was reduced in size and had a yellowish green color. In the blocks of plants (unreplicated) drenched with the fungicides, the main effect was the reduction in the size of the roots and of the tops of the plants drenched with Panogen 15. Plants drenched with Benlate, Mertect, and tap water all had well developed root systems and did not exhibit any indication of chemical phytotoxicity. When the ratings for root development were lumped according to the replicated and randomized foliage spray treatments, the plants sprayed with Dithane M-45 had a trend toward improved root development while the roots of the plants sprayed with Panogen 15 were significantly smaller (Table 3). Since the plants were thoroughly wetted each time the foliage was sprayed, any effect of the sprays on the plants was probably due to the foliage application plus the chemical that dripped onto the soil surface.

DISCUSSION - Efficacy of Benlate was established for safe control of Cylindrocladium rot on azalea cuttings under intermittent mist propagation but not for use on the foliage of potted plants. In the propagation experiments, good control of Cylindrocladium rot was obtained in the cutting drench and cutting soak experiments with Benlate at the 1.0 lb/100 but not at the 0.5 lb/100 rate. The disease control demonstrated that Benlate eradicated spores and/or possible surface infections on the cuttings dipped in a suspension of the disease (all of the cuttings in the control treatment died) and also that Benlate is fungicidally active and sufficiently stable to control Cylindrocladium rot when drenched weekly over cuttings rooting under intermittent mist in a hot greenhouse in the summer. No evidence of phytotoxicity to the foliage or of inhibition of root development occurred in either the drench or the cutting soak experiments. Benlate drenches applied to potted plants similarly gave no indication of phytotoxicity. However, the occurrence of leaf injury that was present on the plants after the second of 20 applications of Benlate 50W to the foliage, suggests that more research needs to be conducted to determine if Benlate can be applied safely to the foliage. No additional injury developed after the second spray. It could not be determined if conditions were any different during the first two sprays than were encountered in the later sprays.
Table 1. Effectiveness of 10 weekly fungicide drenches for the control of Cylindrocladium rot on azalea cuttings during mist propagation.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate 1b/100 gal</th>
<th>Root Index&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Percent of usable cuttings&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benlate 50W</td>
<td>1.0</td>
<td>320</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>273</td>
<td>80</td>
</tr>
<tr>
<td>Mertect 60W</td>
<td>1.0</td>
<td>62</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>91</td>
<td>28</td>
</tr>
<tr>
<td>Inoculated check</td>
<td>H&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>43</td>
<td>13</td>
</tr>
<tr>
<td>Uninoculated check</td>
<td>H&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>298</td>
<td>88</td>
</tr>
</tbody>
</table>

<sup>a</sup>The cuttings were rated 0-3, with a rating of 0 indicating a decayed, unrooted cutting, and a 3 rating a well rooted cutting without disease. The Root Index was the sum of the number of cuttings in each category times the rating.

<sup>b</sup>Each treatment consisted of 20 plants of the cultivars Dark Rose Queen, Dorothy Gish, Erie, Gloria and Improved Redwing. The cuttings were treated and stuck on 7-14-70 and rated on 9-25-70.

Table 2. Effect of 10 minute fungicide soaks for the control of Cylindrocladium rot on azalea cuttings during mist propagation.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate 1b/100 gal</th>
<th>Root Index&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Percent of usable cuttings&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benlate 50W</td>
<td>1.0</td>
<td>156</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>81</td>
<td>48</td>
</tr>
<tr>
<td>Mertect 60W</td>
<td>1.0</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Inoculated check</td>
<td>H&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uninoculated check</td>
<td>H&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>146</td>
<td>87</td>
</tr>
</tbody>
</table>

<sup>a</sup>See footnote Table 1.

<sup>b</sup>Each treatment consisted of 20 cuttings each of the cultivars White Gish, Scarlet Chimes and Hexe. The cuttings were treated and stuck on 7-14-70 and rated on 9-25-70.
Table 3. Root development on potted azaleas after six weekly foliage fungicide applications.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate per 100 gal</th>
<th>Root development&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dithane M-45</td>
<td>0.75 lb</td>
<td>47</td>
</tr>
<tr>
<td>Benlate 50W</td>
<td>0.75 lb</td>
<td>42</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>42</td>
</tr>
<tr>
<td>Daconil 75W</td>
<td>1.5 lb</td>
<td>41</td>
</tr>
<tr>
<td>Mertect 60W</td>
<td>1.5 lb</td>
<td>38</td>
</tr>
<tr>
<td>Panogen 15</td>
<td>25 fl oz</td>
<td>18</td>
</tr>
</tbody>
</table>

<sup>a</sup>Percent of surface of "root ball" covered with roots. Average of 24 pots each of the cultivars Gloria and Dorothy Gish.

To simplify information in "Florida Foliage Grower" it is sometimes necessary to use trade names of products, equipment and firms. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.
WE NEED YOUR HELP
TO HELP YOU BETTER

Complete the following questionnaire and provide needed guidelines for meaningful grower information. Without your assistance our herbicide evaluation program may not solve your problems. Take the necessary time NOW and help us do a better job for you.

Send completed questionnaire to:

Dr. Dennis B. McConnell
Agricultural Research Center
Rt. 1 Box 980
Apopka, Florida 32703

1972 FOLIAGE WEED CONTROL SURVEY

1. Present weed control practices (Percent time allotted to each):
   ________Hand weeding, hoeing
   ________Chemicals, (Herbicides)
   __________Irrigation System
   __________Separate sprayer
   __________Broadcast
   __________Fumigation (Methyl bromide, steam)
   __________Other

2. Chemicals, (herbicides) you are using in the following situations:
   A. Established plants (weeds present)
      1.
      2.
      3.
   B. Established plants (no weeds present)
      1.
      2.
      3.
C. Preplant (weeds present)
1.
2.
3.

D. Preplant (no weeds present)
1.
2.
3.

E. Non crop areas
1.
2.
3.

3. What is your most troublesome weed problem? Which weed(s) in which particular crop(s) give you the most problem?

4. Do you prefer granular herbicides, spray herbicides or hand labor?

5. Would you use a herbicide that gave good weed control but caused some damage to crops and reduced yield? __________ How much crop damage would you accept to obtain weed control _______%. How much loss in crop yield would you accept to obtain weed control _______%.

6. How many times per year would you be willing to apply herbicides to obtain weed control?

7. What is your estimate of annual cost of weed control?
   Stock beds_________ per acre or __________ per sq. ft.
   Growing area_________ per acre or __________ per sq. ft.

8. What is your estimate of yield reduction due to competition from weeds and damage to plants received while hand weeding?

(Optional)
Name________________________
Organization__________________
Address________________________