



# SYSTEMIC

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**B**ENLATE 50W WAS APPLIED at the rate of 1.5 lb per 100 gallons of water in two-row, 800-ft-long plots, replicated four times. The field was planted to 2-year-old Ace variety Easter lilies. Applications of Benlate were made on March 13, 21, 29, April 11, 26, May 17, June 6 and a final application was made after the blossoms were removed in July. The remainder of the field was sprayed with Bordeaux mixture, varying from a 6-6-100 suspension in the early season, to 10-10-100 after Botrytis started showing in the field. A total of 27 Bordeaux applications was made during the growing season.

### Observations

Observations of the field during the growing season and at digging time indicated no significant difference in control of Botrytis leaf blight between eight applications of Benlate and 27 applications of Bordeaux mixture. Bulbs were harvested from 16 paired plots on September 29, 1969. The average weight of 20 bulbs from the Benlate plot was 5.88 lbs and from the Bordeaux plot, 5.76 lbs. Bulblets from plants in the Bordeaux plot were yellow in color while those from the Benlate plots were white. Previous trials with PCNB-Ferbam indicated that dipped

disease-free bulbs were usually white in color while those that had not been dipped (and were diseased) were usually yellow in color.

### Rates

These tests, using Ace variety, compared a growers standard Bordeaux mixture application with Benlate 50W at either 1, 2 or 3 lbs per 100 gallons of water, and a nontreated check. Benlate was applied on April 10 and 25; May 9 and 23; June 5 and 20; and July 9, 1969. Bordeaux mixture was applied a total of 23 times at mixture rates of 10-12.5-100 in the early part of the season, and 12.5-12.5-100 after Botrytis appeared in the field. Each plot was 25 ft long and was replicated five times.

Prevailing winds move from west to east at this site and provide an excellent example of the hazard of allowing an area of "fire" to develop. The fungicidal plots adjacent to the checks and in line with the prevailing wind developed Botrytis symptoms far in excess of treated plots with a source of infection to the leeward (away from the wind) side. Observations during the growing season showed no significant difference in control of Botrytis leaf blight among Benlate 50W at rates of 1, 2 or 3 lbs of the for-

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Benlate, a new systemic fungicide, has recently given excellent control of Botrytis or "fire" of Easter lily foliage in northwest California. Benlate 50W, applied to lilies in 1968, at the rate of 2 lbs of the formulation per acre, produced control equal to, or better than, the standard Bordeaux mixture. Further trials were initiated in 1969 to compare Benlate with Bordeaux in a large scale trial and to test different rates of material in small experimental plots. In another test, bulbs were dipped prior to planting to determine if there was enough systemic activity to control Botrytis through part or all of the season. Disease control in these dipped bulbs was compared with the standard PCNB-Ferbam dip.

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mulation per 100 gallons of water. Twenty bulb samples were harvested and weighed from each plot on September 18, 1969. Average weights per replicate of the treatments are shown in table 1.

Botrytis leaf blight was severe in the check plots and plants were completely defoliated before the end of the growing season—probably accounting for the sig-

# SYSTEMIC FUNGICIDES

## for Control of Some Diseases

### of Easter Lilies

nificant reduction in bulb weight. There was no significant difference in weight of bulbs among seven applications of Benlate 50W at either 1-, 2-, or 3-lb rates and the 23 applications of Bordeaux mixture at 12.5-12.5-100.

Bulbs were selected from this trial for forcing in a growers greenhouse at Smith River and at the University of California at Riverside. Bud counts were made just prior to Easter in 1970 and the results are shown in table 2. Flower bud counts were significantly less in the check at both locations but no significant difference was noted among chemical treatments.

#### Botrytis control

Since earlier research had indicated that Benlate would control Botrytis with fewer sprays, it was decided to test applications of Benlate 2, 3, and 5 times during the growing season. Benlate 50W was used at 2 lbs per 100 gallons of water. Part of the plot was sprayed on April 25, May 9, June 5, 20 and July 9; part sprayed on April 25, May 9 and June 5, and the remainder of the plot on June 20 and July 9. Plants receiving late

applications developed medium-severe Botrytis symptoms. Twenty bulbs were dug from each plot on September 29 and the average weight determined. The results were: 6.97 lbs for 5 applications; 6.6 lbs for 3 applications; and 6.4 lbs for two late applications. These data suggest that lack of Botrytis control early in the season may reduce yield of bulbs.

#### Fungicidal bulb dips

Research conducted by the University of California during the 1954-57 period showed that a combination of PCNB-Ferbam as a bulb dip reduced disease development and changed bulbs from a yellow color to a white color. Other materials were tried during the ensuing years but none equaled results from PCNB-Ferbam treatments.

Recently, several systemic fungicides became available and were tested for control of lily root rot. Bulbs were treated in the fall of 1968 with 1 lb of Vitavax 75W (from UniRoyal); 2 lbs of TBZ 60W (from Merck); 2 and 4 lbs of Benlate 50W (from DuPont); and the standard PCNB 75W (2 lb)-Ferbam 65W (2 lb). Untreated bulbs served as checks.

Dipping time was 5 minutes for all treatments and rates were per 100 gallons of water. Plants were dug and bulbs were weighed on September 29, 1969. Average weight of 20-bulb samples from the plot are shown in table 3.

Benlate at 2 and 4 lbs, PCNB-Ferbam, and Vitavax produced significantly greater weights of bulbs. However Vitavax failed to prevent yellow bulbs as did the checks. Observations indicated that the systemic fungicidal bulb dips applied in the fall at planting did not control Botrytis leaf blight in the spring of 1969.

It is apparent that Benlate is a material comparable with the standard PCNB-Ferbam dip (which has been tested for 15 years) for lily bulb root disease control.

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TABLE 1. EFFECT OF FUNGICIDAL SPRAYS ON WEIGHT OF ACE EASTER LILY BULBS

Treatment	Number of applications	Weight of 20 bulbs (lbs)
Bordeaux 12.5-12.5-100	23	4.58 a *
Benlate 50W, 2 lb.	7	4.50 a
Benlate 50W, 1 lb.	7	4.44 a
Benlate 50W, 3 lb.	7	4.26 a
Check or no treatment		2.66 b

\* Significant 1% level.

TABLE 2. FLOWER BUD COUNT IN GREENHOUSE FORCING TRIALS FROM BULBS PRODUCED IN BOTRYTIS FUNGICIDE PLOTS

Treatment	Number of flower buds per plant	
	Smith River	Riverside
Bordeaux mixture	3.75	5.0
Benlate 50W 1 lb.	3.62	3.86
Benlate 50W 2 lb.	3.21	4.73
Benlate 50W 3 lb.	4.11	4.83
Check or no treatment	2.4	3.13

TABLE 3. WEIGHT OF 20 BULBS TREATED THE PREVIOUS FALL WITH VARIOUS FUNGICIDES

Treatment	Average weight 20 bulbs (lbs)
Benlate 50W, 2 lb.	7.15 a *
PCNB 75W-Ferbam 65W, 2 lb. each.	7.15 a
Benlate 50W, 4 lb.	7.02 ab
Vitavax 75W, 1 lb.	6.67 abc
TBZ 60W, 2 lb.	6.37 bc
Check or no treatment	6.05 c

\* Significant 1% level.