

New fungicides control Botrytis blight of Easter lilies

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Growers spray Bordeaux mixture about 20 to 25 times per season to control Botrytis diseases of Easter lily. The bluish-white spray residue sticks firmly to the foliage even in heavy rain. This is one reason for its effectiveness; but because the spray residue is opaque it interferes with roguing to control other diseases. An example is fleck, caused by cucumber mosaic interacting with lily symptomless virus, which must be controlled by early and efficient roguing of infected plants. Bordeaux spray residue may mask fleck symptoms, making detection of diseased plants difficult or impossible.

Another less obvious drawback is that Bordeaux mixture may stunt plant growth. In a previous field trial designed to test Bordeaux (among other fungicides) as a pre-planting bulb dip, treated bulbs yielded smaller plants. Both foliage and bulbs were reduced in size, though Bordeaux was reasonably effective in controlling diseases carried on the bulb.

It is more difficult to show stunting from Bordeaux spray residue on the foliage than on the bulbs because Botrytis is always too severe on field-grown lilies to allow normal growth in the absence of an efficient spray program. It is difficult to provide an effective check consisting of plants protected from Botrytis that are also free from the stunting effect of Bordeaux. In the field trial described below, two relatively efficient spray materials were applied and reduction of bulb size by Bordeaux spray residue on the foliage was demonstrated.

Field trials

The two fungicides tested have not previously been used in northern California Easter lily fields. They were Ronilan (3-(3,5-dichlorophenyl)-5-ethenyl-5-meth-

yl-1, 3-oxazolidine-2, 4-dione) and DuPont 4424—both 50 percent formulations and used at the rate of 1 pound of the formulation per 100 gallons of water. Four ounces of Rohm and Haas B-1956 spreader sticker were applied to complete coverage of the foliage. Fungicides were applied on April 27; May 5, 12, 17, 22, and 29; June 7, 14, 21, and 27; July 5, 13, and 25; and August 9 and 25. Bordeaux mixture 10-10-100 was applied 26 times in adjacent rows by the grower

Table 1 shows the average weights of 30 bulbs from the two fungicide treatments and the non-sprayed treatment. For comparison, four samples of bulbs routinely sprayed by the grower with Bordeaux mixture were dug from immediately around the block of experimental plants. Apart from spraying, plants in the trial and the surrounding field were equivalent in origin and treatment. The one inconsistency was that there were only 20 bulbs in one field-run sample sprayed with Bordeaux mixture and 17 in another. There were 30 bulbs in each of the other two Bordeaux samples. Yields on the basis of 30 bulbs were calculated for the two deficient replicates.

Statistical analysis showed the increases in bulb weight from spraying with Ronilan and DuPont 4424 were highly significant. Differences between Ronilan and DuPont 4424 in average bulb weight were insignificant. The bulbs from the Bordeaux treatment were about the same weight as the controls. This does not imply that Bordeaux mixture was useless; if it had not been applied to all the plants in the surrounding field, the spore load would have become so heavy that the foliage of the checks would have been destroyed earlier in the season and the bulb weight greatly reduced.

Table 2 shows another aspect of yield.

The bulbs were passed over a grader and the numbers of various sizes were recorded. In each treatment there was a characteristic distribution of sizes. Sizes for DuPont 4424 were clustered tightly around the 7-inch grade. For Ronilan the distribution was spread a little, and there were more 8- and 9-inch bulbs. The check and Bordeaux distributions of bulb size were definitely wider spread. Bulb sizes in the Bordeaux treatment were more dispersed even than in the checks. There were unmarketable 5-inch bulbs from the latter two treatments.

Weight and estimate value in cents per bulb are also given in table 1. Values were based on the following average prices for each bulb size: 9-inch, 45.1 cents; 8-inch, 41.8 cents; 7-inch, 33 cents; and 6-inch, 25.3 cents. According to this estimate the gain from Ronilan and DuPont 4424 over spraying with Bordeaux and not spraying was about 5 cents per bulb. The difference, 14 percent, is highly significant. This may also be taken as a minimum estimate of the stunting effect of Bordeaux mixture. The total gain from spraying with Ronilan and DuPont 4424 would, of course, be greater than 14 percent because of indirect protection afforded to check plants by spraying the surrounding lily fields. Weekly spray treatments were stopped after blooming, and, had harvest continued, yield differences would probably have been greater.

Further trials are planned in the 1979 season, comparing Ronilan and DuPont 4424 with Bordeaux mixture on a large-scale, commercial-grower trial. Neither Ronilan nor DuPont 4424 is now registered for use in the United States.

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TABLE 1. Comparison of Fungicides for the Control of Botrytis Leaf Blight on Easter Lily

Treatment	Weight of 30 bulbs (lbs)	Average value/bulb (cents)	Disease rating, June 27
DuPont 4424 50W, 1 lb	4.15a*	35.0	0.13 a
Ronilan (BASF 352) 50W, 1 lb	4.26 a	36.6	0.14 a
Bordeaux mixture 10-10-100	3.73 b	30.3	0.55 b
No treatment	3.63 b	31.2	2.0 c

*Weights followed by different letters are significantly different at the 1% level.

TABLE 2. Bulb Size after Various Fungicide Spray Treatments for Control of Botrytis Leaf Blight on Easter Lily

Size (inches)	DuPont 4424	Ronilan	Bordeaux*	No treatment
9	0	3	1 (1.2)	1
8	31	45	13 (16.1)	15
7	85	64	62 (76.7)	86
6	4	8	11 (13.6)	9
5	0	0	10 (12.4)	9

*Numbers of bulbs counted, and (in parentheses) numbers equated to a total of 120.