

## THE CONTINUING BATTLE AGAINST ROSE POWDERY MILDEW

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A continuing battle between fungicides and powdery mildews has been in process ever since it was discovered years ago that dusting sulfur on roses and other plants would protect them from infection. Since that time many other chemicals have been used to control powdery mildews, but without much success.

Sulfur and lime sulfur not only damage many plants, but will damage nearly all plants when air temperatures are high. This is also true of dinocap (Karathane®)† and several other materials.

Recently, several systemic fungicides have been produced by the chemical industry. Benomyl (Benlate®) is absorbed by the roots of some plants (snapdragons and hydrangeas, for example) and translocated to the top growth, thus protecting it from infection by powdery mildew. Another experimental product, dimethirimol (Milcurb®), is also absorbed by some plants (cucumbers) and translocated to the tops where mildew is controlled. Unfortunately neither of these fungicides is taken up sufficiently by rose roots to control powdery mildew.

So the problem of effectively controlling mildews still exists since an ideal fungicide must control the disease without injuring the host crop. This is essential because the host plant is continually growing and new foliage that is not protected by fungicides is susceptible. While many fungicides eradicate existing infections and also give some protection against new infection, roses present a difficult problem since they are among the most sensitive plants subject to damage from pesticides. Dinocap injures rose foliage if the temperature is above 85 F. Young tender plant tissues are especially susceptible to injury. Piperlin (Pipron®) may cause a leaf drop of the Golden Wave rose variety, and one or two other varieties are also slightly susceptible.

As a consequence, tests were made at the San Lorenzo Greenhouse Company on Snow Song variety roses. Several experimental fungicides were used and were compared to the one used by the grower for controlling mildew.

A garden-type sprayer was used in these tests. The plants were first sprayed at 2-week intervals, and then once a week. Evaluations were made on or before the day of each spraying. Each treatment was replicated three times. The air temperature in the early afternoons on the days the roses were sprayed ranged from 62 to 76 F; the relative humidity ranged from 47 to 60 percent.

The equivalent of 4 fluid ounces per 100 gallons of the surfactant Triton® B-1956 was added to each treatment to improve wetting. But, with high-pressure spraying equipment, it is usually possible to use less surfactant and still achieve control that is generally better than that with low-pressure, garden-type sprayers.

It is interesting to note in table 1 that when spraying at intervals of 2 weeks, the severity of mildew increased in all treatments, but declined when the interval was reduced to 7 days. EL-273 was outstanding in controlling powdery mildew on roses. The other treatments were about equal in performance, although there was some indication that piperlin performed better than benomyl and cyclomorph when the spraying interval was 2 weeks.

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†®= Registered trade name

Table 1.

Treatment <sup>2</sup>	Application Rate Per 100 Gal	Date of Powdery Mildew Rating and Evaluation <sup>1</sup>						
		1/19	2/4	2/24	3/16	3/24	3/31	4/7
benomyl 50%	½ lb	21.6	25.0	154.3	146.3	59.0	11.3	22.6
EL-273 4.5%	1 pt	9.6	17.3	32.6	38.6	10.6	2.0	2.0
piperalin 82.4%	¼ pt	27.0	44.0	70.3	87.6	31.0	16.0	21.0
cyclomorph 40.0%	2 pt	31.3	34.3	116.3	159.0	40.0	21.3	23.3
no spray	—	100.3	93.6	93.0	145.0	177.6	62.0 <sup>3</sup>	138.6

<sup>1</sup> Average number of 5-leaflet leaves with one or more mildew infections.

<sup>2</sup> Spray applications were made on 1/7, 1/20, 2/5, 2/26, 3/16, 3/24, and 4/1. The chemicals used were:

benomyl—methyl 1-(butylcarbamoyl)-2 benzimidazolecarbamate made by E. I. DuPont de Nemours and Company.

cyclomorph—cyclododecyl dimethylmorpholine acetate, a BASF product not sold in the United States.

EL-273—α-(2, 4-dichlorophenyl)-α-phenyl-5-pyrimidinemethanol, an experimental fungicide of Elanco Products Company.

piperalin—3(2-methylpiperidino) propyl-3, 4-dichlorobenzoate, a product sold as Piprin<sup>®</sup> by Elanco Products Company.

<sup>3</sup> First replication mistakenly treated with cyclomorph on 3/24.

From Flower and Nursery Report, Agric. Ext. Service, University of California. April 1971.

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