

# Controlling powdery mildew in greenhouse roses

Albert O. Paulus □ Seward T. Besemer □ Jerry Nelson

**P**owdery mildew is the most widespread disease of roses. The causal fungus, *Sphaerotheca pannosa* var. *rosae*, appears as a white or gray powdery or mealy coating on the leaves, tender stems, and flowerbuds. The fungus frequently causes malformed leaves and unsightly flowers, which reduce economic returns to growers.

Because several new fungicides have become available for use against powdery mildews, we evaluated them during 1985 and 1986 in San Diego County rose greenhouses. The variety *Royalty* was used in both trials, because it is very susceptible to powdery mildew.

## 1985 trial

Plots in the first trial consisted of 34 rose plants, replicated four times for each treatment. Light powdery mildew was present before application of the first spray.

Fungicide treatments were NuStar (flusilazol), Systhane (myclobutanil), Rubigan (fenarimol), Award (penconazole), Spotless (diniconazole), and the check or no treatment. (See table 1 for formulations and rates per 100 gallons of water.) Three ounces of Triton AG98 spreader-sticker per 100 gallons of water were used in all except the Systhane and check treatments. Sprays were applied to full coverage with a 2-gallon Hudson CO<sub>2</sub> sprayer at 30 pounds per square inch (psi). Applications were made on July 23, August 2, 9, and 16. Severity of the powdery mildew disease was rated on a scale of 0 to 10 on August 23, with 0 indicating no powdery mildew present, and 10 indicating mildew completely covering the leaves.

NuStar and Systhane effectively controlled rose powdery mildew (table 1) under conditions of high inoculum pressure, which had developed later in the test. Rubigan, Award, and Spotless, at the rates used, were not commercially effective for mildew control. All fungicides were significantly better than no treatment.

## 1986 trial

Plots in the 1986 trial consisted of 80 rose plants, replicated four times for each treatment. Powdery mildew was present in the rose range before application of the first spray.

Experimental fungicide treatments were NuStar, Systhane, Pipron (piperalin) plus Bayleton (triadimefon), Maag 15-1297, ICI PP 969, and the check treatment. (See table 2 for formulations and rates per 100 gallons of water.) Sprays were applied to full coverage as in the 1985 trial. Applications were on July 8, 15, 22, and 29, and August 8 and 15. ICC PP 969 was applied as a soil drench on July 8 and August 5 in 3 gallons of water per 30 square feet.

We also used the grower's series of applications as one of the treatments for this trial. Pipron plus Bayleton was applied on July 8 and 29, Milban (dodemorph) on July 15 and August 12, and Pipron plus Triforine (triforine) on July 22 and August 5.

Triton AG 98 spreader-sticker, at 3 ounces per 100 gallons of water, was used in all except the Milban, ICI PP 969, and the check treatments. Disease ratings were made on August 19, on a scale of 0 to 10, as in the previous trial.

**TABLE 1. Effect of foliar fungicide sprays for control of powdery mildew, *Sphaerotheca pannosa* var. *rosae*, of 'Royalty' rose in the greenhouse, San Diego County, 1985**

Treatment	Disease rating August 23*
NuStar (flusilazol) 40%, 4 fl. oz.	2.3 a
Systhane (myclobutanil) 4OW, 4 oz.	3.2 a
Rubigan (fenarimol) 12.5%, 4 fl. oz.	6.0 b
Award (penconazole) 10W, 6 oz.	6.2 b
Spotless (diniconazole) 25W, 3 oz.	6.3 b
No treatment	8.8 c

\*Severity rated on a scale of 0 to 10; 0 = no mildew; 10 = mildew completely covering the leaves. Duncan's multiple range test used at 1% level. Treatment means followed by the same letter are not significantly different.

**TABLE 2. Effect of foliar fungicide sprays for control of rose powdery mildew of 'Royalty' rose in the greenhouse, San Diego County, 1986**

Treatment	Disease rating August 19*
NuStar 40%, 4 fl. oz.	1.7 a
Systhane 4OW, 4 oz.	2.6 a
Pipron (piperalin) 82.4%, 4 oz. + Bayleton (triadimefon) 50W, 4 oz.†	2.6 a
Maag 15-1297 4E, 2 fl. oz.	4.1 b
ICI PP 969, 5 gram/30 sq. ft.	4.1 b
No treatment	8.6 c

\* Rated on a scale of 0 to 10 as in 1985. Duncan's multiple range test used at the 5% level.

† Grower's series of treatments: Pipron + Bayleton on July 8 and 29; Milban (dodemorph) EC 39%, 32 oz., on July 15 and August 12; and Pipron 82.4%, 4 oz., + Triforine EC 18.2%, 16 oz., on July 22 and August 5.



NuStar, Systhane, and the grower's series of treatments, starting with Pipron plus Bayleton, provided excellent control of rose powdery mildew and were significantly better than any of the other materials tested (table 2).

The ICI PP 969 fungicide application did not result in any control of powdery mildew after the first drench on July 8. The second application of this material on August 5 caused a phytotoxic reaction to the rose plants: internodes were shortened, and at least four leaves of the new growth were curled and distorted. Two weeks after the second application, we began to see some control of powdery mildew and the new growth returned to normal.

Maag 15-1297 was significantly better than no treatment but, at the rate used, did not give adequate commercial control of rose powdery mildew.

## Conclusions

NuStar and Systhane, two new unregistered fungicides, were effective in controlling severe powdery mildew in greenhouse rose trials in 1985 and 1986. Registered fungicides Pipron, Bayleton, Triforine, and Milban, applied in different combinations, provided effective control of rose powdery mildew in the 1986 trial.

Albert O. Paulus is Plant Pathologist, and Jerry Nelson is Staff Research Associate, Cooperative Extension, University of California, Riverside; and Seward T. Besemer is Farm Advisor, San Diego County.