

Fungicide and Nematicide Update

JOHN E. WATKINS, University of Nebraska, Lincoln

New Fungicides for Ornamental Disease Control

Several new products are entering the U.S. market or are being tested for use in ornamental disease control. Many were developed in Europe and are widely used there, some have limited ornamental labels in the United States, and others are still in the experimental stage of development. Emphasis seems to be on sterol-inhibiting systemics or narrow-spectrum systemics active against *Pythium* and *Phytophthora*.

Bitertanol (Baycor, Bay KWG 0599) is a protectant foliar fungicide with local systemic activity against various ascomycetes and basidiomycetes causing rusts, mildews, scabs, and leaf spots on ornamentals. In a New Jersey test on azalea and lilac, bitertanol effectively controlled powdery mildew (*Microsphaera alni*) on both hosts. Tests in Virginia, Oklahoma, New Jersey, and Wisconsin with different formulations at different rates applied to roses generally gave adequate control of powdery mildew (*Sphaerotheca pannosa*), rust (*Phragmidium* sp.), and black spot (*Diplocarpon rosae*). Bitertanol showed both protective and eradication possibilities against hawthorn rust (*Gymnosporangium globosum*) but was not particularly effective against crabapple rust (*G. juniperi-virginianae*). Efficacy was good against scab of firethorn (*Fusicladium pyracanthae*). The shoot-blight phase of sycamore anthracnose (*Gnomonia platani*) was reduced by foliar application of bitertanol in an Illinois test.

Studies in New Jersey and Ohio indicated dodemorph (Milban) was effective against powdery mildews on azalea, delphinium (*Erysiphe* spp.), lilac, and greenhouse roses. Dodemorph is an eradicant fungicide that is absorbed by foliage and roots to give systemic protection. The material is phytotoxic to cineraria and begonia.

The sterol inhibitor ectaconazole (Vanguard, CGA-64251) is an experimental wide-spectrum systemic fungicide effective at low rates. Ectaconazole was evaluated in many of the same trials as bitertanol and was similar in efficacy against scab diseases of crabapple and firethorn and rusts of crabapple and hawthorn. It failed to provide adequate protection against black spot of rose in Oklahoma and Wisconsin tests. In Ohio, ectaconazole was effective against powdery mildew on greenhouse roses but left an intolerable residue at the high rate. Control of rose

rust in Wisconsin was marginal. Ectaconazole reduced the shoot-blight phase of sycamore anthracnose in Illinois when applied twice to the foliage in early and mid-April.

A new label for a 5% granular formulation of ethazol (Truban) was recently approved for ornamentals. The material is mixed into the planting media before potting to control damping-off and root and stem rots caused by *Pythium* spp. In an Ohio study, however, it did not control *Pythium* root rot (*P. splendens*) of Easter lily.

Imazalil (Fungaflor, Freshgard, Deccozil, Bromazil) is a systemic fungicide with specific activity against *Helminthosporium*, *Fusarium*, and *Septoria* spp. The product is highly effective against benzimidazole-resistant strains of *Penicillium* and against a range of powdery mildews of ornamentals. Its performance against rose black spot in Wisconsin and New Jersey tests was marginal, but control of *Septoria* leaf spot (*S. cornicola*) of dogwood was excellent even up to 7 weeks after the last application.

The turfgrass fungicide iprodione (Chipco 26019, Rovral, 26019 RP) is also registered for use on several ornamentals. Iprodione is a long-lasting, wide-spectrum, nonsystemic protectant fungicide active against *Botrytis*, *Monilia*, and *Sclerotium*, plus several other fungal genera. Studies in Alabama, Florida, and New York on petal blight (*B. cinerea*) of geranium and azalea indicated a high degree of activity by both the 50W and 25E formulations. Soil drenching of rooted begonia cuttings significantly reduced Rhizoctonia root rot (*R. solani*) in a Florida test but did not control root rot in a Washington test on Easter lily even when used in combination with ethazol 5G. In another Washington test, iprodione gave satisfactory control of ink spot (*Drechslera iridis*) on bulbous iris. Iprodione at a high rate was as effective as imazalil against *Septoria* leaf spot of dogwood, but efficacy was marginal at the low rate. When applied to marigold in North Carolina, iprodione was highly effective against *Alternaria* leaf spot (*A. tagetica*). Iprodione showed neither protectant nor eradicant activity against *Naemacyclus minor*, the causal agent of *Naemacyclus* needle-cast of Scots pine.

The new systemic metalaxyl (Subdue, Ridomil, Apron, CGA-48988) is a residual fungicide with long-lasting activity against species of *Pythium* and *Phytophthora*. Metalaxyl gave marginal control of *Pythium* root rot of Easter lily

in one Ohio study. In another Ohio study, the high rate of metalaxyl provided acceptable control of *Phytophthora* root rot (*P. cinnamomi*) of rhododendron but failed to control the disease at the low rate.

Phosethyl Al (Aliette, 32545 RP) is a new systemic material active mainly against *Phytophthora* spp. causing root and stem rots on many ornamentals. This highly mobile fungicide, which is translocated upward as well as downward in the plant, can be used as a protectant or for curative treatment. In one Ohio study, high rates of phosethyl Al applied as a drench or top dressing or incorporated into the container medium controlled *Phytophthora* root rot of rhododendron, but in another Ohio study, similar treatments with phosethyl Al were not effective against *Phytophthora* crown and root rot (*P. parasitica*) of azalea and, furthermore, significantly reduced top growth.

Another new material with specific activity against phycomycetes is propamocarb (Banol). As with metalaxyl, its widest use at present is to prevent *Pythium* blight of turfgrass. Propamocarb is a soil-applied systemic fungicide that can also be used as a seed protectant and as a dip treatment for bulbs and tubers. In an Ohio study, drench applications of propamocarb provided a satisfactory level of control of *Pythium* root rot of Easter lily. A combination of propamocarb and benomyl showed the highest efficacy.

The wide-spectrum sterol inhibitor propiconazol (Tilt, CGA-64250) shows activity against certain ascomycetes, basidiomycetes, and deuteromycetes but has little or no activity against phycomycetes. In New Jersey, applications to roses and delphinium at 10-day intervals through much of the growing season gave excellent protection against black spot and powdery mildew.

Pyrazophos (Afugan) is a systemic foliar fungicide active against powdery mildews. When it was applied to greenhouse roses in Ohio, control of powdery mildew was fair to borderline at high and low rates. Phytotoxicity was noted for both rates.

Triadimefon (Bayleton, Bay MEB 6447), another systemic sterol inhibitor, provides wide-spectrum protective and curative activity primarily against powdery mildews and rusts. Triadimefon was effective against powdery mildews of azalea (New Jersey), lilac (New Jersey), and rose (Ohio) in three 1981 tests. In Louisiana, weekly treatment of camellia

for flower blight (*Sclerotinia camelliae*) significantly reduced the number of blighted flowers. Two applications of triadimefon prevented hawthorn rust development but did not control crabapple rust. Repeated treatments of photinia reduced the number of leaf spots (*Entomosporium maculatum*) in a Virginia study. Care must be taken when triadimefon is sprayed onto the foliage of certain ornamentals; in an Alabama study, it produced ring spot and marginal necrosis of azalea petals.

Vinclozolin (Ornalin, Ronilan, MF 647) is a selective contact fungicide active against species of *Botrytis*, *Monilinia*, and *Sclerotinia*. In three Ohio studies,

vinclozolin gave marginal control of Septoria leaf spot of dogwood but failed to control Botrytis blight of English ivy or Rhizoctonia root rot of Easter lily. Biweekly sprays of azalea for Rhizoctonia web blight did not significantly reduce defoliation but did significantly reduce plant size. Vinclozolin did not protect bulbous iris from ink spot.

Certain fungicides may cause phytotoxicity when used on certain ornamentals. Cedar seedlings treated with chlorothalonil (Daconil 2787, Exotherm Termil) showed injury in the form of needle browning, tip burn, or defoliation at both low and high rates in two Ohio tests. Metalaxyl and propamocarb

applied as drenches in another Ohio study caused leaf yellowing and browning and defoliation of gloxinia. In a third Ohio study, iprodione at both low and high rates caused significant injury to hydrangea in the form of necrosis, bleaching, and/or defoliation.

Dr. Watkins is editor of the ornamentals and trees section of Fungicide and Nematicide Tests, William C. Nesmith, Editor, published annually by the New Fungicide and Nematicide Data Committee of The American Phytopathological Society. Copies of current and past volumes may be obtained from Richard E. Stuckey, Business Manager F & N Tests, Plant Pathology Department, University of Kentucky, Lexington 40546.