

# Fungicide and Nematicide Update

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## New Fungicides for Small Fruit Disease Control

From the huge strawberry and grape production systems in California to the "pick-your-own" operations throughout the Midwest and Northeast, small fruits are a significant part of agricultural production in the United States. The range of small fruits produced is wide, but the most economically important are probably grape, strawberry, blueberry, and brambles (primarily blackberry and raspberry). Each of these crops is susceptible to at least one—and in most cases more than one—fungal disease capable of destroying the crop or even the planting. Because resistance to most of these diseases is not currently available, the proper use of fungicides is extremely important in small fruit production.

Results of 54 fungicide trials on small fruit are published in volumes 36, 37, and 38 of *Fungicide and Nematicide Tests*: 41 on grape, 6 on strawberry, 5 on blueberry, and 2 on brambles. Although a considerable amount of testing has been conducted on grape, very little has been done on the other small fruits. This may be because relatively few plant pathologists conduct active research on small fruit, other than grape, and because the acreage of most small fruit crops is not sufficient to justify the cost to industry of pursuing a label. Despite this, several new fungicides have been labeled for use on small fruit and a number of experimental compounds look promising.

**Grape.** Most fungicide testing on grape has been for control of black rot (*Guignardia bidwellii*), downy mildew (*Plasmopara viticola*), powdery mildew (*Uncinula necator*), and bunch rot (*Botrytis cinerea*). Triadimefon (Bayleton), a sterol-inhibiting fungicide with systemic activity, has been widely tested for control of black rot and powdery mildew, usually with excellent results. In Ohio, Bayleton controlled black rot when applied up to 4 days after onset of infection. This "kickback" or "curative" action should be useful in disease forecasting systems for black rot control. Bayleton received a federal label on grapes in 1983 and is widely used for control of both black rot and powdery mildew. Other sterol-inhibiting fungicides (experimental numbered compounds) are currently being tested on grape.

Downy mildew is not a serious problem in most grape production regions along the West Coast because of the dry climate. It is a serious problem in

the Midwest and East, however, and new fungicides are urgently needed. Metalaxyl (Ridomil) and cyprofuram (Vinicur) have been widely tested and provide good to excellent control of downy mildew, but a major concern is the potential for development of resistance in plant-pathogenic fungi. In attempts to prevent or delay such resistance, both fungicides have been tested in combination with other fungicides, including mancozeb and folpet. Ridomil was recently labeled for control of potato late blight (*Phytophthora infestans*) and is being marketed as Ridomil MZ-58, a 58% wettable powder containing 10% metalaxyl and 48% mancozeb. Neither Ridomil nor Vinicur is labeled for grape in the United States.

In regions where downy mildew and black rot are problems, they often occur simultaneously in the same vineyard. This presents difficulties with the new fungicides. Bayleton provides excellent control of black rot and powdery mildew but is ineffective against downy mildew; the reverse is true with Ridomil and Vinicur. Because growers must have a fungicide program that will control all the major pathogens present, many tests have emphasized fungicide combinations that provide a wider spectrum of disease control.

Vinclozolin (Ronilan) and iprodione (Rovral) have been widely tested for control of bunch rot and both provide good control. Several states have been granted Section 18 labels (emergency use permits) for Ronilan, and California has received a Section 18 label for Rovral to control bunch rot.

**Strawberry.** The majority of testing on strawberry has been for control of gray mold (*B. cinerea*), leather rot (*Phytophthora cactorum*), Rhizopus rot (*Rhizopus* spp.), and Alternaria rot (*A. tenuissima*). Ronilan and Rovral have been extensively tested for gray mold control, with excellent results. Ronilan received a federal label for control of gray mold on strawberry in 1982 and is widely used.

In Ohio, foliar applications of Ridomil have been very effective in controlling leather rot. Protectant fungicides, such as captan, thiram, and folpet, provide at least partial control of leather rot, but benomyl (Benlate), thiophanate-methyl (Topsin M), and Ronilan, all widely used for gray mold control, provide little or no control of leather rot. This is another situation where fungicide combinations may be necessary for a wider spectrum of disease control.

Several compounds have been evalu-

ated for control of Rhizopus and Alternaria fruit rots, with generally poor results. New fungicides effective against these diseases are badly needed.

Red stele root rot (*Phytophthora fragariae*) is a serious disease of strawberry. At present, the only control measures are cultural practices (good soil drainage), soil fumigation, and resistant cultivars. In Connecticut, spring and fall drench applications of Ridomil significantly controlled red stele. The second year after transplanting, plants treated with Ridomil produced 161% more total fruit by weight than untreated plants (McIntyre, J. L., and Walton, G. S. 1981. *Plant Dis.* 65:835-836). The introduction of Ridomil into strawberry production systems could mean new approaches for controlling red stele.

**Blueberry and brambles.** Very little fungicide testing has been reported on blueberry and brambles. The captafol (Difolatan) label was expanded in 1980 to include blueberry, and Difolatan is currently labeled for control of Fusarium canker (*F. putrefaciens*), mummy berry (*Monilinia vaccinii-corymbosi*), Phomopsis canker (*P. vaccinii*), and anthracnose fruit rot (*Colletotrichum gloeosporioides*). In 1981, triforine (Funginex) was labeled for control of mummy berry. Funginex is the first sterol-inhibiting fungicide to be labeled on blueberry and provides excellent mummy berry control. Unpublished results from R. Sterne of the Department of Plant Pathology, University of Arkansas, Fayetteville, indicate that fall and spring drenches of Ridomil may be highly effective in controlling Phytophthora root rot (*P. cinnamomi*) of blueberry.

Ronilan and Rovral have provided excellent control of Botrytis gray mold on raspberry, and Washington and Oregon have received emergency use permits for Ronilan. Research in Washington has shown that fall and spring drenches of Ridomil are highly effective in controlling Phytophthora root rot (*P. erythroseptica*) of raspberry, and Washington and Oregon have been granted emergency use permits.

*Dr. Ellis is editor of the small fruit section of Fungicide and Nematicide Tests, David F. Ritchie, 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.*