

Professional Fungicides for Botrytis Control

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In the 1970's, benzimidazole fungicides such as benomyl and thiophanate methyl allowed a higher level control of *Botrytis* blight than the protectants previously used. Unfortunately, resistance to these new systemic products rapidly developed in the *Botrytis* populations. In the early 1980's, another class of fungicides became available. The dicarboximide fungicides (vinclozolin and iprodione) were introduced and control of *Botrytis* was again greatly advanced. As with the benzimidazole fungicides, resistance has developed to these fungicides (ex: Ornalin and Chipco 26019) especially in the eastern states. The continued efficacy of these fungicides is based on rotation and/or mixtures with protectant fungicides such as chlorothalonil (ex: Daconil Ultrex) or mancozeb (ex: Dithane, Fore and Protect T/O).

In the mid 1990's, a new product, Medallion, was labeled for a variety of ornamental diseases including *Alternaria* leaf spot, *Rhizoctonia* stem and root rot and *Botrytis* blight. The active ingredient is fludioxinil and the product is one of the few contact fungicides to be labeled in the past fifteen years. It bears the distinction of being labeled for use on ornamentals prior to agronomic or fruit crops. Medallion is a 50WP (Syngenta) and is very effective in controlling *Botrytis* blight on a number of ornamentals. Original use rates were higher than those labeled today and may have occasionally caused phytotoxicity on some crops.

Decree 50WP (SePro) was labeled for *Botrytis* control on ornamentals in 1999. The active ingredient is fenhexamid, which belongs to still another chemical class. This fungicide has proven an excellent tool for *Botrytis* control and even affords some curative action.

Review of Trials at Chase Research Gardens, Inc.

Our tests have consistently shown that Chipco 26019 WP, Decree, Medallion, and Daconil Ultrex have performed best. Control achieved with copper products has been variable and sometimes worse than spraying with water alone. These tests have included Camelot, Junction, Kocide TNO 2000, and Phyton 27. These results are in direct contrast to grower reports and company experience in the Midwest and East Coast greenhouses.

We have run tests over the past nine years to understand these differences. We have been able to demonstrate copper toxicity on many crops under conditions that keep leaves wet for long periods following a spray. It is common throughout the West Coast for high humidity, cool temperatures, and rainfall to encourage leaf wetness on many plants for 8 or more hours. The damage that is caused is sometimes dramatic but usually not detectable. However, once it occurs, *Botrytis* spores may fall on healthy leaves and disease occurs. Under greenhouse conditions that promote rapid drying (common in

colder climate structures) use of copper compounds has been successful since phytotoxicity doesn't occur.

Strobilurins, such as Compass O and Heritage, give some control of *Botrytis* with Compass O a little more effective than Heritage. This may be due to the differences in systemic character of these two compounds and characteristics of *Botrytis*. Heritage is systemic from the bottom up and rapidly moves into leaf tissue after spraying. Compass O is only locally systemic as it is retained in the wax layer of the leaf. This may be why Compass O has more activity than Heritage in the immediate area of a spray. Since *Botrytis* isn't an internal pathogen and most of its structures are on the surface of the damaged area, it is most important to concentrate the fungicide there. Other diseases (like downy mildew) form inside the leaf before emerging and in their case Heritage works a little better than Compass O.

Overall, the best *Botrytis* fungicides remain unchallenged with Chipco 26019 (iprodione), Decree (fenhexamid), Daconil (chlorothalonil) and Medallion (fludioxinil) giving the best control.

Choosing a rotation or tank mix

It is advisable to rotate fungicides between chemical classes to minimize chances for development of resistance in *Botrytis* populations. History has clearly demonstrated the ability of this fungus to develop resistance rapidly once a new fungicide has been introduced into broad scale use. Efforts to determine the best resistance management program have generally shown that either tank mixing (with products from different chemical classes) or rotating can be equally effective. Tank mixing is easier to keep track of but may be more expensive. Currently labels of some new products require rotations or alternating.

As always, be sure to read and follow label directions for use of all fungicides. The products described in this article may not be legal for use yet or in your state on all crops. The information is provided to allow growers more informed choices on product safety and efficacy- no recommendation is being made.

| Chemical Class | Fungicide | Active Ingredient | Source | Control Grade |
|------------------------------|------------------------------|---------------------------------------|-------------------|---------------|
| Dicarboxide | Chipco 26019 WP | Iprodione | OHP | A |
| | Chipco 26GT | Iprodione | Bayer | A- |
| Phenylpyrrole | Medallion | Fludioxinil | Syngenta | A |
| Cyclohexane carboximide | Decree 50WDG | Fenhexamid | SePro | A |
| Strobilurin | Compass O | Trifloxystrobin | Olympic | B+ |
| | Heritage 50WG | Azoxystrobin | Syngenta | B |
| | BAS500 | Pyraclostrobin | BASF | C to B+ |
| Aromatic-substituted benzene | Daconil Ultrex | Chlorothalonil | Syngenta | A |
| | ConSyst | Chlorothalonil/ Thiophanate methyl | Regal Chemical | B |
| | Spectro 90 WP | Chlorothalonil/ Thiophanate methyl | Cleary Chemical | F to B+ |
| Benzimidazole | SysTec 1998 | Thiophanate methyl | Regal Chemical | C |
| | 3336 WP | Thiophanate methyl | Cleary Chemical | C |
| Triazole | Strike 25W | Triadimefon | Olympic | B |
| | Terraguard 50W | Triflumizole | Crompton Uniroyal | B |
| EBDC (carbamate) | Protect T/O | Mancozeb | Cleary Chemical | B |
| | Dithane NT Rainshield | Mancozeb | DOW | B |
| Botanical Extract | Triact 70EC | Neem extract | Olympic | B |
| Inorganic Copper | Junction | Mancozeb/ Cupric hydroxide | SePro | C- |
| | Camelot | Cupric hydroxide | Whitmire Microgen | C- |
| | Kocide TNO | Cupric hydroxide | SePro | C |
| | Phyton 27 | Copper pentahydrate | Source Technology | C |
| Bicarbonate | Milstop | Potassium bicarbonate | BioWorks | F |