

New Chemicals for Managing Disease on Glasshouse Ornamentals

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Chemical management of disease often is of highest priority in glasshouse crops because cosmetics or "zero disease tolerance" is so important. One of our goals is to develop better systems for integrating chemical management more fully with cultural management, and some recently registered chemicals may help us.

Many labels on existing pesticides have been expanded to crops grown under glass. Much of this activity is due to a coordinated effort on testing efficacy and phytotoxicity of chemicals on ornamental plants, led by the IR-4 Project. Four or 5 years ago, IR-4 delineated needs and funded research into the safety and performance of products on ornamentals. Research results keep coming in, and the program is continuing. To date, we have received expanded labeling for such fungicides as Triforine, Daconil 2787, Kocide 101, Banrot, and Truban.

Diamond Shamrock's chlorothalonil (Daconil 2787) is now labeled on a number of ornamental plants, although "greenhouse-grown" is not yet mentioned specifically on the label. Crops of interest to greenhouse growers include azaleas, carnations, chrysanthemums, geraniums, lilies, and roses. Daconil 2787 is a good general fungicide. I have found it useful for controlling many diseases in addition to those printed on the label, and I hope further label expansions will ensue—and that "greenhouse-grown" will appear on the label.

Kocide 101 has recently been granted label expansion for greenhouse-grown ornamental crops. The label lists aralias, azaleas, begonias, bulbs, carnations, chrysanthemums, ivy, roses, and yucca. Common diseases that should be controlled are noted with each crop. Copper fungicides are broad-spectrum but leave an unsightly residue on plants, especially those grown under glass. Nevertheless, the Kocide 101 label is quite useful and should help with some disease management problems.

Powdery mildew diseases are troublesome on many ornamentals. The label on Triforine emulsifiable concentrate (EC) fungicide has recently been expanded and

now lists powdery mildews on outdoor-grown calendula, crapemyrtle, dahlia, euonymus, Jerusalem thorn, lilac, phlox, photinia, roses, snapdragons, and zinnias. The label also includes rusts on asters, carnations, poplars, and roses. This EC fungicide should not leave objectionable residues, which increases its usefulness for ornamentals.

The soil-drench fungicides Truban and Banrot have gone through a couple of label expansions. The Banrot label currently lists 22 bedding plants, 15 foliage plants, 18 herbaceous container plants, and 25 woody container plants. The Truban 30% wettable powder label lists 24 bedding plants, 13 foliage plants, 11 herbaceous container plants, and 13 woody container plants. Growers should be aware that Truban as a 25% emulsifiable concentrate is also available but has a label different from that of the 30WP. Truban 25EC lists 17 bedding plants, 22 foliage plants, 8 herbaceous container plants, and 8 woody container plants. Truban has recently been released as a 5% granular, with 14 foliage plants, 12 herbaceous container plants, and 16 woody container plants listed on the label. It is hoped that the company (Mallinckrodt) will continue to work on these labels to make them more consistent with each other. "Greenhouse-grown" does not yet appear on Truban and Banrot labels.

A new broad-spectrum systemic-contact fungicide recently labeled by Mallinckrodt for use on many ornamental and nursery crops is called Zyban and is a combination of 60% mancozeb and 15% thiophanate-methyl. The extensive list of crops on the label includes many bedding plants. The label is written in an interesting style: Host plants are listed together in one section of the label, with up to nine different diseases or disease groups listed by number after each host plant. Pathogens are listed in another section of the label where disease categories are more fully explained.

Two new fungicides are now available for the control of *Botrytis* diseases on greenhouse ornamentals. Chipco 26019 lists 29 hosts, which include herbaceous, bulb, and woody plants. We have found that this wettable powder fungicide is best used at the low end of the labeled rate range, thus lessening residue problems. Chipco 26019 is also labeled for chrysanthemum ray blight. Ornalin is another product now cleared for control of *Botrytis* and *Sclerotinia* diseases; 34

herbaceous plants, 6 woody ornamentals, and 4 bulb and corm hosts are listed. Both products are exceptionally good at controlling *Botrytis* in the greenhouse.

Subdue 25% EC is now available for control of damping-off and root and stem rot diseases caused by *Pythium* and *Phytophthora*. This fungicide (known also as Ridomil) has been used for some time on ornamentals in other countries and on other crops in this country. The label lists 7 foliage plants, 15 bedding plants, 5 flowerpot- or bed-grown plants, 12 woody ornamentals, and conifers in nurseries. I have found the product to be extremely effective but have also noted a tendency toward phytotoxicity when dosages recommended on the label are exceeded even slightly. To be safe, I generally recommend that growers use the lower figures in the dosage ranges given on the label.

Several newer fungicides have a *single* ornamental crop labeled! Bayleton 25% WP is useful for controlling *Ovulinia* petal blight on azalea. Milban 39% EC is registered for powdery mildew on greenhouse-grown roses. Expanded labels for other crops and diseases are badly needed for these fungicides.

Most fungicides under development in the United States are already being used in Europe, and we can turn to our European counterparts for information about what may lie ahead. For instance, Bayleton 25% WP has shown much promise for control of powdery mildews, but its growth-regulator effects on greenhouse crops can be harmful. Fungaflor and Rubigan also look good against powdery mildews. Aliette effectively controls *Pythium* and *Phytophthora* on many ornamentals in the greenhouse. All these chemicals are available and widely used in other countries.

The chemicals being developed will help meet our needs to manage diseases of glasshouse-grown ornamentals. There has been some concern worldwide that pathogens may become resistant to some of these new chemicals soon after their introduction. We hope to get glasshouse crop labels quickly before resistance of major pathogens makes the chemicals unattractive from a marketing standpoint. I urge plant pathologists interested in the welfare of the glasshouse industry to proceed with due haste in developing these chemicals, and I hope that growers and chemical manufacturers will continue to contribute and cooperate.