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**110. Fungicides in unique mode-of-action groups.** Chase, A. R. Greenhouse Management and Production 30(11):28-29. 2010.

Left: Downy mildew on buddleia

Below: Phytophthora on pansy

By A. R. Chase

## Fungicides in unique mode-of-action groups

This is the sixth of a 6-part series detailing mode-of-action groups for disease control comparing relative efficacy, resistance and phytotoxicity characteristics.

**M**any of the newest ornamental fungicides that are the sole representative of a particular mode-of-action group are primarily registered for Oomycetes. This very important group of plant pathogenic fungi includes *Phytophthora*, *Pythium* and the downy mildew fungi such as *Peronospora*,

*Bremia* and *Plasmopara*.

Virtually no fungicide is initially developed for use on ornamentals. It is likely that development of some of the new Oomycete fungicides was based on the importance of these diseases and not because this type of fungicide was easier to discover and develop.

Over the past few years labeling changes have been made with very special conditions placed on the use of some of these new fungicides. This is probably a result of the increased understanding of resistance management and also a growing caution to avoid resistance and losing effective fungicides.

### Resistance risk ratings

Adorn, Segway, Stature SC and Subdue MAXX are each a sole representative of

a mode-of-action group for ornamentals (Table 1). Each would be a good choice in a rotation program designed to manage resistance development. However, trying to use them together with their particular labeling might be a challenge. These products also have a unique ranking by the Fungicide Resistance Action Committee. This evaluation is made based on the actual mode of action as well as reported cases of resistance.

Adorn (active ingredient fluopicolide) does not have an actual evaluation of potential for resistance development. This is probably because little is known about how this new mode-of-action group acts. Even the exact mode of action is not well understood. As a result, Valent USA Corp. has taken a very conservative stance to manage resistance.

Segway (active ingredient cyazofamid) has an unknown risk of resistance development but since some model systems (probably lab or bioassay tests) have mutated at the target site resistance management is required.

Resistance has been reported for Stature (active ingredient dimethomorph) on grape downy mildew, but not in potato late blight. Stature has been judged to have a low to medium risk of resistance development.

Many cases of resistance have been reported for Subdue MAXX (active in-

redient mefenoxam) in both ornamentals and vegetables. It is considered at high risk of resistance development.

### Labeling for resistance management

Adorn has interesting resistance management wording on its label. Tank-mixing is required for any use which covers *Pythium*, *Phytophthora* and downy mildew. This is ostensibly for resistance management. The label lists some possible tank-mix partners depending on which pathogen is being targeted.

Research trials with Adorn alone have shown good to excellent control of *Phytophthora* and downy mildew. *Pythium* control trials have not shown efficacy in many instances. The Adorn label also recommends using integrated pest management techniques to help manage resistance development.

The Segway label has more standard resistance management terminology recommending either alternation or tank-mixing. Its label also limits the number of applications per crop or per year. This may be an environmental issue, but also would aid in resistance management.

The Stature SC label recommends alternation or tank-mixing and also limits the number of consecutive applications to a crop before switching to another mode-of-action group fungicide.

Subdue MAXX is newly registered on ornamentals for downy mildew control. Its label contains important resistance management conditions. The re-entry interval changes from 0 hours for drench applications of Subdue MAXX to 48 hours for foliar sprays on downy mildew. It also must be tank-mixed for downy mildew and there are limits to the number of consecutive applications depending on the target pathogen.

### Use considerations

Before using these unique mode-of-action group chemicals consider the following key characteristics:

- Mode of action – these are all single representatives so any alternation or tank mix would work to manage resistance development.
- The modes of action are narrow when known making the risk of resistance relatively high.
- The re-entry interval is 12 hours with the exception of Subdue MAXX (48 hours for downy mildew).
- Tank-mixing costs more than alternation since you should never reduce rates below those labeled.
- Adorn cannot be used alone. **!**

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Table 1. Some ornamental fungicides representing unique modes of action.

Fungicide	Manufacturer	Active ingredient (Mode-of-Action Group)	Activity range	Crop fungicides (resistance reported)	Resistance management strategies
Adorn	Valent USA Corp.	Fluopicolide (43)	Downy mildew, <i>Phytophthora</i>	No (not known)	Tank-mix required; integrated pest management suggested.
Segway	FMC Corp.	Cyazofamid (21)	Downy mildew, <i>Phytophthora</i> , <i>Pythium</i>	Yes (not known, considered medium to high risk)	Tank-mix or alternation; limits to applications per crop or year.
Stature SC	BASF Corp.	Dimethomorph (40)	Downy mildew, <i>Phytophthora</i>	Yes (yes, considered low to medium risk)	Tank mix or alternation; limits in consecutive applications.
Subdue MAXX	Syngenta Crop Protection	Mefenoxam (4)	Downy mildew, <i>Phytophthora</i> , <i>Pythium</i>	Yes (yes, considered high risk)	Tank-mix for downy mildew; tank-mix or alternation for <i>Pythium</i> and <i>Phytophthora</i> ; limits in consecutive applications.

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### ON THE COVER

Up to 95 percent of the crops grown at Casa Verde Growers in Columbia Station, Ohio, end up in Pettit Garden Centers throughout the Cleveland area. See page 10.

Photo by Jeremy Studios

### COVER STORY

## 10 Primed for retail sales

Casa Verde Growers in Columbia Station, Ohio, adapted its production to meet the changing needs of its retail operation, Pettit Garden Centers.



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