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Biological and Conventional Fungicides for Powdery Mildew Management in Common Cut Flowers

First, you need to know about PM

- There are 5 common pathogens that cause Powdery mildew.
- *Golovinomyces chitoracearum* is the pathogen that infects zinnia. If your zinnias are infected then nearly all of your PM sensitive flowers are threatened as this one affects most flowers.
- PM inoculum is nearly always around.
- Warm, humid nights with warm lower humidity days are most ideal.
- Keeping inoculum reduced along with protectants does play a role in maintaining good flowers.
- High N fertilizers can increase infection.

Materials tested in our program

- Chlorthalonil (Daconil*, Bravo...) 7-13 ml/gallon
- Azoxystrobin (Heritage) 1-4 oz/100 gallon (1.2ml/gallon)
- Bacillus subtilus QST 713(Rhapsody*, Serenade) 20-78ml / gallon
- Potassium bicarbonate (Armicarb 100*, Milstop +others) 12-24g/gallon
- Insecticidal soap (M-Pede* and Olympic) 2.5-5oz/gallon
- Compass (Trifloxystrobin) 1-4oz./100 gallon (1.2ml/gallon)
- Coppers (Phyton-27*, Kocide, Champ) 1.5-2.5oz/10 gallons

Control: water spray only



Oklahoma Formula Mix

Other treatments:



Chlorthalonil
(Daconil - Bravo)



Other treatments:



Heritage / strobilurin



Other treatments



Rhapsody (*Bacillus subtilis*)



Other treatments:



Tricon (Sodium
Tetraborohydrate
Decahydrate)



Armicarb O (potassium
bicarbonate)

Other treatments:



Milstop (potassium bicarbonate)

M-Pede (potassium fat soap)

Note black spots on leaves:
Bacterial leaf spot

Other treatments:



Compass



Phyton 27 (fixed
copper)

Comments

- All treatments were better than the water control.
- Potassium bicarbonate is good for no more than 2x treatments in a row due to phytotoxicity.
- Rhapsody does a fair job on PM, but must be reapplied every 4-5 days for real control
- M-Pede slows down the development by 2-4 weeks, but as inoculum increases and the conditions move to optimum either the frequency must be increased beyond 4-5 days or it simply no longer can manage the disease.
 - I'm not sure which applies, but does it matter?

More comments

- Heritage and Compass provided excellent PM stoppage, but are limited in their use for resistance management.
- Copper did pretty well. We used Phyton -27, would other formulations do as well?
- Tricon: Now marketed as PREV-AM with no ornamental label.
- Other biologicals such as Mycostop (S.griseoviridis), Actinovate (S.lydicus), Regalia (Giant Knotweed, Ryania extract), and Vermicompost solutions / teas?

More comments still

- For crops like zinnia, is it even worthwhile to do anything, but the most cursory PM control?
 - If you replant every 2 weeks, then you can abandon and mow off heavily infested areas.
 - With Benary's Giants it takes almost perfect conditions plus heavy inoculum for truly damaging PM.
 - During the worst conditions perhaps the best bet is some protective sprays to keep PM slow and work with succession plantings.

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Thank you!

**Your comments and questions
please**