Biological and Conventional Fungicides for Powdery Mildew Management

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Managing Powdery mildew requires a knowledge of the narrow range of conditions that support the growth of these fungi. Powdery mildew is not a single fungi, but a group of fungi that infect plant tissue and cause the symptoms known as Powdery mildew. There are specific species that infect various plants. Nearby plants of another genus will not be affected unless the correct species is present. All types infect plants when the nights are warm with high humidity and the days are warm with low humidity. The temperature range that will support infection is 70-80F.

The most common pathogens that cause Powdery mildew infection in cut flowers are Golovinomyces chicoracearum, Erysiphe polygoni, Phyllactinia guttata, Sphaerotheca fuliginea and Podosphaera macularis. Gary Moorman, PSU Professort of Plant Pathology has created and posted an excellent table with the Host Plant Cross List at <http://www.ppath.cas.psu.edu/EXTENSION/PLANT_DISEASE/pdf%20Misc/Powdery%20mildew%20by%20hostcross-listing.pdf>. This list is very useful in understanding what needs to be treated based on which plants are currently under attack. Unfortunatly, if your zinnias are infected, then most other cut flowers are likely to be infected since Golovinomyces chicoracearum affects almost all cut flowers.

Over the past 6 years, under a grant program funded by NE SARE, we’ve been evaluating various conventional, organic and biological fungicides for their control of powdery mildew (PM) on zinnias and other cut flowers. Here are some observations from that program:

1. Bacillus subtillus (Rhapsody, Serenade and Companion): Controlling PM is one of the really strong areas with these bacterial products. Application needs to be often when conditions are favorable, but if applied every 3-5 days during those periods, control is within tolerable limits.
2. Copper complexes and fixed coppers (Kocide, Phyton 27 and Champ): Although these materials control PM better than our water control plots, coppers would not be the materials to choose if good control of PM is important.
3. Chlorthalonil (Bravo, Daconil, Exotherm Termil…..): This is one of the most important protectants on the market to keep PM infection low and slow. During high pressure periods use as a primary component in a tank mix with a Strobilurin (ie. Compass) or Triazole (ie. Strike) for best control.
4. Strobilurins (Heritage, Cygnus, Insignia and Compass): PM readily develops resistance to these materials. Only use them in rotation with a good protectant. Our field experience is that you get immediate control on first application, then progressively lose control if you are not rotating between FRAC codes and using a protectant such as chlorthalonil.
5. Potassium bicarbonates (Armicarb, Milstop, and Kaligreen): We keep trying to make these materials work as they have very low REI’s and PHI’s, but they cause serious phytotoxic reactions after only 1-2 applcations. They seem to give good control at first, but the tendency to burn leaves and flowers makes using them for cut flower production very limited.
6. Neem oils (Trilogy and Triact): Although early reports from Grace Co. indicated than Neem oil would be useful for controlling nearly every fungal disease known to mankind, in the field this has been far from the case. One caveat: heavy pressure on Neem supplies has created a substantial amount of discussion over what fractions are in each material. The early work was with raw emulsified oil, but most of the packages are of various fractions. It is very possible that rawer products may work on PM.
7. Potassium salts of fatty Acids (M-Pede and other soaps): We’ve sprayed a lot of M-Pede over the years on zinnia PM. When the conditions for infection are borderline, the soaps work very well when used at maximum labeled concentrations. As conditions move closer to ideal for PM, the soaps tend to work poorly.
8. Ryania extract (Regalia): This relatively new material looks worth trying as it stimulates or prepares the plants own defensive system along two cross communicating pathways. It will be in the 2010 trials program.

Rules for Powdery mildew management:

-Don’t expect to get a full blown infection under control. Once plants are heavily infected, they are usually garbage. Perennials like Monarda will get infected annually. With some fungicide application, you can keep these healthy enough so that they keep coming back.

-Use protectants like copper, chlorthalonil and mancozeb regularly as conditions favor disease development. This will slow infection and allow you to up your game on control.

-Most cut flowers have variable resistance across varieties. Benary’s Giant Zinnias are much more tolerant or PM than other common varieties. Choose resistant varieties when possible.

-Even if you are planting in succession, as plants come into bloom, the stress of creating flowers coupled with the presence of the pathogen and favorable conditions will require fungal control.

-Keep your plants as stress-free as possible. Trickle irrigate and apply high P and K fertilizers to keep them growing rapidly. Avoid high N fertilizers as this will not only support PM, but also encourage aphids, whiteflies and other sucking pests.