Managing Cucurbit Powdery Mildew Conventionally – Key Points for Success

Margaret Tuttle McGrath
Plant Pathology and Plant-Microbe Biology Section, SIPS, Cornell University
Long Island Horticultural Research and Extension Center (LIHREC)
3059 Sound Avenue, Riverhead, NY 11901; mtm3@cornell.edu

1. Grow resistant varieties. They provide useful but variable suppression of powdery mildew from limited in pumpkin and squash to very high in cucumber. See https://www.vegetables.cornell.edu/pest-management/disease-factsheets/disease-resistant-vegetable-varieties/

2. Check upper and lower surfaces of at least 50 older leaves for symptoms weekly beginning at the start of fruit formation, which is a physiological stress that causes plants to become susceptible. Symptoms often appear first on lower surface.

3. Begin applying fungicides as soon as symptoms seen and continue on a weekly schedule. Conditions typically remain favorable throughout the growing season because powdery mildew develops when it is dry; a prolonged period of rain is unfavorable.

4. The most effective fungicides are those able to move into leaf tissue and thereby redistribute to the lower surface where powdery mildew develops best. They can do so without affecting the plant because they have single-site mode of action targeted to the pathogen. Unfortunately, this also means these fungicides are at risk for resistance developing in the pathogen and rendering them ineffective. The cucurbit powdery mildew pathogen has proven very adept at developing resistance.

5. Some fungicides are no longer as effective as they were in the past because the pathogen has developed resistance to them.

   Topsin M (FRAC code 1) and **QoI fungicides** (Cabrio, Flint, Quadris, etc.) (11) are not expected to provide any control because almost all pathogen isolates tested have been found to be resistant.

   Endura, **Pristine**, and **Merivon†** (all FRAC 7) are not recommended because isolates with full resistance (insensitive to highest label rate) are common and there are other SDHI fungicides (**Luna Experience**, **Aprovia Top**) that bind enough differently that they are not fully cross resistant.

   Isolates have been found every year with resistance to **Torino** (U6) and **Quintec** (13), especially in crops treated twice. They are expected to provide poor to good control, depending on frequency of resistance in the pathogen population in a crop. Either product is recommended applied at most once; however, effective control can be achieved with a program consisting of other chemistry not affected by resistance yet.

6. When resistance has rendered ineffective one fungicide used in a program applied to a commercial crop, this might not be obvious when the other fungicides used are effective because the reduction in control might not be substantial and thus noticeable.

7. Isolates of the powdery mildew pathogen have been detected with resistance to multiple fungicides, most notably with resistance to Quintec, Torino, and Endura/Pristine/Merivon. This means applying one of these fungicides can select for resistance to all.

8. Currently recommended fungicides include:

   Vivando (50), but not **Prolivo** because it has not exhibited as good efficacy in university fungicide evaluations although its active ingredient is in the same FRAC group.

   DMI fungicides (3) and **SDHI fungicides** (7). While resistance has been detected affecting efficacy of some DMI and SDHI fungicides, others are effective reflecting differences among these fungicides in how they bind to the target site or multiple genes being involved in resistance. Recommended **DMI fungicides** are **Proline** (it was the most effective fungicide tested at LIHREC in 2020), **Procure**, **Luna Experience**†, and **Rhyme**†. **Ceyva** is not recommended because it did not exhibit good control especially on the lower leaf surface. Recommended SDHI fungicides are **Aprovia Top** (FRAC 3 + 7), Luna Experience† (3 + 7), and **Miravis Prime**† (7 + 12). These 3 have a different SDHI active ingredient (AI). The second AI in Miravis Prime† (12) does not have activity for powdery mildew, in contrast with Aprovia Top and Luna Experience†.

   Gatten (U13) has exhibited variable efficacy; it was moderately effective in a fungicide evaluation in PA in 2021.

   Winter is a good time to develop your fungicide program. See examples below. All targeted fungicides have limits on maximum number of applications, and most cannot be applied more than twice consecutively.

9. Fungicide resistance is dynamic. Expect this pathogen to develop resistance to additional fungicides and thus fungicide recommendations to continue to change.

10. Within a week of the last application, look at severity of powdery mildew on the lower surfaces of leaves to assess degree of control obtained and potential need to change the program for the next year.

† not labeled for use on Long Island.

Example recommended targeted fungicide programs (there are other good combinations) (including a contact, protectant fungicide with each application is recommended):

Proline, Vivando, Proline, Vivando, Luna Experience†, Vivando (6 applications total)*.

Proline, Vivando, Proline, Vivando, Procure, Vivando, Procure (7 applications total)*.

Proline, Vivando, Proline, Vivando, Aprovia Top, Vivando (7 applications total)*.

Proline, Vivando, Aprovia Top, Proline, Vivando, Luna Experience†, Procure, Vivando (8)*.

*program has maximum number of applications of Proline and Vivando permitted to a crop.

Contact fungicides include sulfur (do not use on melons), chlorothalonil, mineral oil, and biopesticides (see https://www.vegetables.cornell.edu/ipm/diseases/biopesticides/).

There is additional information about this disease and its management at

https://www.vegetables.cornell.edu/pest-management/disease-factsheets/cucurbit-powdery-mildew/

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations if there is a conflict. Note that some products mentioned are not permitted used on Long Island. Check labels for use restrictions. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

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