Management of Cucurbit Downy Mildew for Gardeners

Dr. Mary K. Hausbeck, Jarrod Morrice, and Sheila D. Linderman

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Michigan is the number 1 producer of pickling cucumbers and number 3 producer of fresh market cucumbers in the nation. *Pseudoperonospora cubensis* infects a variety of cucurbit crops including cucumbers, squash, pumpkins, watermelons, cantaloupes, zucchinis, gourds and honeydew melons and causes cucurbit downy mildew. Downy mildew re-emerged as a problem on cucumbers in Michigan in August 2005 when the disease spread across the eastern region of the United States and has recurred every year since then.

Recognizing Downy Mildew on Cucurbits

- Yellowing on top surface of leaves bound by veins
- Velvety or fuzzy dark spore growth on the underside of leaves

Downy mildew causes symptoms on the leaves similar to angular leaf spot. Yellow lesions may be visible on the top surface of infected leaves. However, the telltale sign of downy mildew is the gray to black fuzz on the underside of the leaf giving a somewhat "dirty" or "velvet" appearance. This fuzz may be most evident in the morning.

Downy mildew is well-known for causing catastrophic losses in a brief period of time. *Ps. cubensis* is an obligate biotroph, meaning it cannot live long without a host plant. This condition restricts the pathogen to warmer climates during the winter months, including southern states and greenhouses. Downy mildew spreads to surrounding fields on air currents via tiny, microscopic spores that act as seeds of the pathogen. Cool (~ 60° F), wet, and cloudy conditions create an ideal environment for downy mildew spores to survive outside the host. When the conditions are favorable, unprotected foliage can become completely blighted within 14 days of the initial infection.

To achieve early detection of downy mildew, the airborne spores of the pathogen are sampled using spore traps placed in Michigan's major growing regions during the spring and summer. These spore traps continuously sample the air and collect spores by imbedding them on a film that is removed and taken to the laboratory for identification and quantification. A compound microscope is used to identify and count *Ps. cubensis* spores that are present on the tapes. The spore traps help us to detect an influx of spores into those production regions where the spore traps are located, but are not used to time fungicide sprays.

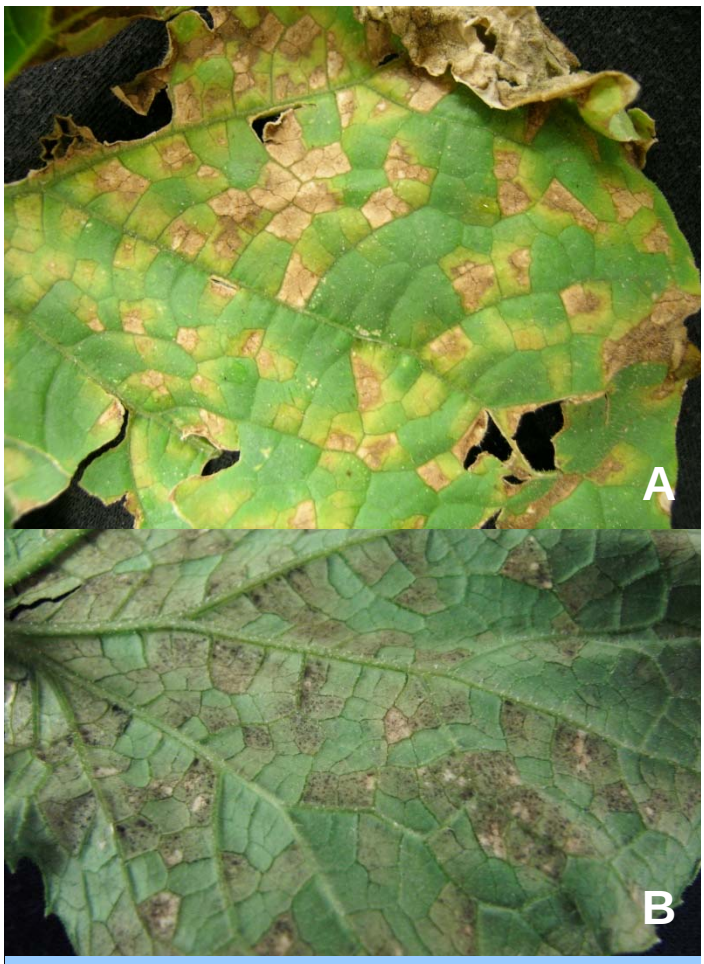

Figure 1. A, top side of cucumber leaf with yellow lesions defined by the veins. B, underside of cucumber leaf displaying dark fuzzy spore masses.

There are few management practices that can be used to control downy mildew. Before the downy mildew outbreak of 2005, the disease was effectively controlled through host resistance. However, since then no cucumber cultivar has been identified that exhibits complete resistance to downy mildew. A

management strategy for gardeners should focus on using preventive measures to reduce the chances that cucurbit downy mildew becomes established. Since downy mildew normally becomes established in late summer within Michigan, planting cucurbits early in the season will allow gardeners to get more fruits from their crop before downy mildew becomes a problem within the state. Reducing the optimal environmental conditions for *Ps. cubensis* growth is another option. For instance, gardeners should avoid watering at times when moisture will remain on the foliage for extended periods of time, such as in the evenings. If downy mildew becomes established in or near a garden, fungicides containing the active ingredient chlorothalonil will provide some protection against the disease.

Go to www.veggies.msu.edu and look under "Cucurbit Downy Mildew News" for more information. If you need help identifying cucurbit downy mildew, click on the link "How to submit samples," for instructions on how to submit diseased samples to MSU Plant Diagnostics.

A spore trap used for monitoring airborne downy mildew spores.

***Ps. cubensis* spore observed using a compound microscope and blue dye.**

Symptoms of downy mildew on (A) cantaloupe (B) watermelon and (C) acorn squash. Lesions on these crops are not as noticeably angular when compared to the symptoms on cucumber.

How To Control Downy Mildew

- Plant cucurbit crops early in the season.
- Water when foliage can dry rapidly.
- Avoid watering during the evening.
- Fungicides containing the active ingredient chlorothalonil can be used to prevent downy mildew and slow the progression of the disease once it has become established.

NOTE: Remember the pesticide label is the legal document on pesticide use. Read the label and follow all instructions closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals, and the environment, and can also lead to civil or criminal fines and/or condemnation of the crop. Pesticides are good management tools for the control of pests on crops, but only when they are used in a safe, effective and prudent manner according to the label.

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