A3978

Cucurbit Downy Mildew
Identification and Management

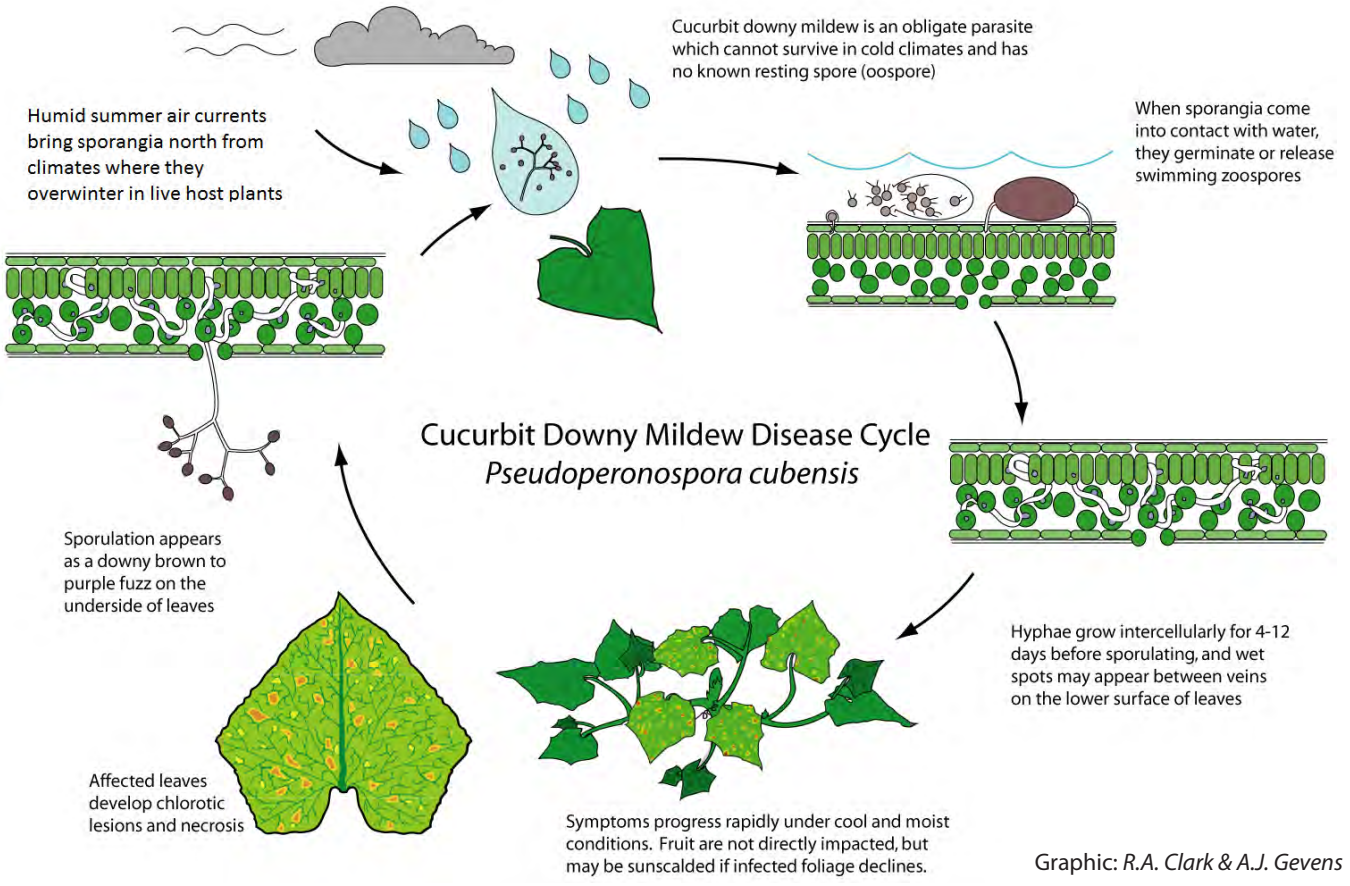
Amanda Gevens and Michelle Marks

Cucurbit downy mildew is a potentially serious disease of all plants in the gourd family (Cucurbitaceae), including cucumber, watermelon, cantaloupe, pumpkin, and squash. The disease causes sudden, rapidly developing and widespread foliar disease epidemics that can be very destructive. In recent years in the midwestern United States, cucurbit downy mildew has been found primarily on cucumber.

Disease spread and variability

Cucurbit downy mildew is caused by the fungus-like organism *Pseudoperonospora cubensis*. This pathogen typically spreads from southern regions to northern regions in the form of airborne spore-like structures (called *sporangia*) that are produced on infected plants. The pathogen is not known to survive in areas where subfreezing temperatures occur in the winter.

It is generally accepted that there are variants of *P. cubensis* (called *pathotypes*) that have specific cucurbit host preferences. Recent research indicates that pathotypes occurring in the United States may have the potential to recombine, thus resulting in greater variability in pathogen traits such as host range, virulence (i.e., ability to cause high levels of disease), fungicide resistance, and soil persistence.



Graphic: *R.A. Clark & A.J. Gevens*

Ideal conditions

Environmental conditions favoring cucurbit downy mildew include cloudy, overcast skies; high humidity (more than 6 hours at 100% relative humidity); and air temperatures of 59–77˚F.

Symptoms and effects

A typical symptom of cucurbit downy mildew is the presence of yellow to brown angular leaf spots (i.e., areas on leaves with veins as the edges). On the undersides of these angular areas, the pathogen produces fuzzy, brown to purple sporulation that is diagnostic for the disease.

Downy mildew produces no direct symptoms on cucurbit fruits. However, when foliage declines, fruit may be susceptible to sunscald. The sunscald is then followed by colonization by saprophytic microorganisms, causing further fruit decay. Healthy foliage is necessary for photosynthetic activity to maintain expected fruit number and quality.

Management

Management of cucurbit downy mildew relies on a combination of the use of resistant cultivars, early disease detection, and timely use of fungicides. Resistant cultivars have been developed for cucumber and cantaloupe, and to a lesser extent for squash and pumpkin. Popular downy mildew–resistant processing cucumber varieties include 'Cates', 'Fancipak', and 'Calypso'. While host resistance effectively controlled cucurbit downy mildew prior to 2005, resistant varieties now only slow disease development and cannot be relied upon as the only method of disease management.

Due to the aggressive and destructive nature of the disease, early detection and the use of preventative fungicide applications are imperative for control. The use of forecasting systems available at **cdm.ipmpipe.org** can help predict the timing of outbreaks and aid in the planning of initial fungicide applications. Fungicide applications should be timed based on forecasts as well as regional field observations.

Typical foliar symptoms of cucurbit downy mildew.

Photo: *Gerald Holmes, Valent Biosciences*

Distinctive masses of pathogen spores on leaf underside of cucumber (above) and butternut squash (below).

In conventional commercial production, there are currently several reduced-risk, single-site mode of action fungicides available. These fungicides can be effective when used in combination and alternation with broad-spectrum protectant fungicides containing the active ingredient chlorothalonil. For organic producers, copper-containing fungicides provide the best control of downy mildew. Coppers are also appropriate in a home garden setting.

For specific fungicide recommendations for Wisconsin, refer to the UW-Extension publication *Commercial Vegetable Production in Wisconsin* (A3422), available through the Learning Store website (learningstore.uwex.edu). In all cases of pesticide use, refer to current label directions to protect people and the environment. Failure to do so violates the law.

Resources

From the American Phytopathological Society:

Downy Mildew of Cucurbits
www.apsnet.org/edcenter/intropp/lessons/fungi/Oomycetes/Pages/Cucurbits.aspx

From North Carolina State University:

Cucurbits—Downy Mildew
www.cals.ncsu.edu/plantpath/extension/fact_sheets/Cucurbits_-_Downy_Mildew.htm

Downy Mildew Resistance
cuke.hort.ncsu.edu/cucurbit/cuke/cukehndbk/cukedownymildew.html

Symptoms of downy mildew of cucumber, when uncontrolled, 7 days after initial infection.

Field-level symptoms of cucumber downy mildew, approximately 5 days after initial infection.

University of Wisconsin-Extension

Authors: Amanda Gevens is assistant professor and Michelle Marks is graduate research assistant of plant pathology, College of Agricultural and Life Sciences, University of Wisconsin–Madison. Gevens holds a joint appointment with the University of Wisconsin–Extension, Cooperative Extension. Cooperative Extension publications are subject to peer review.

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