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CLEMSON COOPERATIVE EXTENSION

Cucurbit Downy Mildew Management for 2015

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Cucurbit downy mildew affects most cucurbits (vine crops in the squash family) in South Carolina every year, especially in summer and fall. Downy mildew spreads quickly on cucumber, muskmelon and watermelon. Prevention before it appears, and prompt action after it appears, are needed.

Symptoms and Signs

Leaf spots on cucumber (left photo above) or cantaloupe start as pale green to yellow, angular spots that turn brown. Leaf spots on squash and pumpkin (right photo above) are small, bright yellow flecks across the leaf surface. A slight yellowing may be seen around the edges of the spots or on other parts of the leaf that are already infected.

Brownish-purple spores are found on the bottom of infected leaves in the early morning. They give the underside of the leaf a "dirty" appearance as seen in the photo to the right. If you need assistance with diagnosing cucurbit downy mildew, contact your horticulture Extension agent, the Plant Problem Clinic (www.clemson.edu/public/regulatory/plant_industry/pest_nursery_programs/plant_prob_clinic/), or the Home Garden Information Center (www.clemson.edu/extension/hgic).

How Cucurbit Downy Mildew Spreads

Downy mildews do not survive on crop debris or in soil. They grow only on living plants. Cucurbit downy mildew survives the winter on crops in southern Florida and Texas, where cucurbits do not freeze.

In the spring, wind blows cucurbit downy mildew northward from the South. Spores move farthest and fastest during cloudy, windy weather. Spores can be blown 600 miles in 48 hours! Cucurbit downy mildew also can be moved on infected transplants.

Outbreaks of cucurbit downy mildew, which is caused by a water mold, are most likely in places with wet, warm weather when spores are moving. Rain washes spores out of the air onto leaves. Rain, dew, or fog makes infection likely. After infection, downy mildew will continue to get worse even in dry weather if temperatures are above 60°F.

The Cucurbit Downy Mildew Forecast map at cdm.ipmpipe.org/ shows where outbreaks of downy mildew have been reported. The site also predicts where spores will spread from the known sources, and where weather will be favorable for an outbreak in the next 48-72 hours.

Cultural Practices to Limit Downy Mildew

- To avoid downy mildew, plant cucurbits as early as possible. This disease is a greater threat to summer and fall crops than to spring crops.
- Choose cucumber cultivars with resistance to downy mildew. Although these cultivars still get disease, it will start later than on susceptible ones.
- Use trellises for cucumber vines, so that the leaves dry quickly after dew or rain.
- Summer squash, zucchini, and acorn squash tolerate some downy mildew. They still produce marketable fruit when diseased.

Spraying for Cucurbit Downy Mildew

Fungicides are necessary to manage downy mildew.

1) When to start spraying is a tricky question to answer, because the time spores arrive is different each year. Along the coast of South Carolina, cucurbit downy mildew usually shows up on or after May 1. In the Midlands and Upstate, downy mildew usually appears on or after June 1. A preventive spray program for other

diseases that includes chlorothalonil or mancozeb will give a head start before downy mildew spores blow in.
2) Sign up for the Cucurbit Downy Mildew Alert System at cdm.ipmpipe.org/alert. You will receive an e-mail or text message when new outbreaks are reported to the system. Start spraying when downy mildew is found in your state.
3) Once the first spray is applied, continue spraying on a 7-day schedule.
4) Cucurbit leaves form a very dense canopy. High pressure (at least 75 psi) and high volume (75 or more gallons of water/acre) are needed once vines touch each other.
5) Apply fungicides before a predicted rain rather than after it rains. To stick and work, fungicides must be dry on the leaves before the rain starts.

Fungicide Programs

Two different fungicide programs are recommended to prevent and manage cucurbit downy mildew (Table 1).

1) Use Program 1 in Table 1 to **prevent** downy mildew. Spray chlorothalonil, mancozeb, or Zampro before downy mildew is found on a crop.
2) Once downy mildew has been found in a field, use different fungicides to **manage** it. Spray at least two of the following three fungicides in rotation with each other: Ranman + protectant, Gavel (no protectant needed), or Omega + protectant (Program 2 in Table 1). Rates and other details are in the Southeastern U. S. Vegetable Crop Handbook at www.thepacker.com/grower/2015-southeastern-us-vegetable-crop-handbook.
3) Rotate fungicide products to reduce the **risk of fungicide resistance**. Tank mixing fungicides specific for downy mildew with protectants also helps prevent fungicide resistance.
   In most parts of the U.S., cucurbit downy mildew is resistant to Ridomil, Revus, and strobilurin fungicides (FRAC Group 11: Cabrio, Quadris, Flint, Pristine, and Reason). Forum, Presidio, Previcur Flex, Tanos, or Curzate may not always work. These fungicides are not recommended in SC against cucurbit downy mildew.
4) On summer **squash**, using protectant fungicides may be enough to prevent yield loss from downy mildew.
5) In **organic** production, fixed copper fungicides help to prevent cucurbit downy mildew, but only if they are applied before infection.

Downy Mildew on Watermelon

Fall watermelon is at risk from downy mildew. Use the spray schedule in Table 2 for fall watermelon, muskmelon, and cucumber

Table 1. Fungicides Recommended Against Cucurbit Downy Mildew

	Tank mix with protectant*	
	No	**Yes**
Program 1: Prevent Before symptoms	chlorothalonil or mancozeb	Zampro
Program 2: Manage After symptoms	Gavel	Ranman or Omega**

**Protectants are chlorothalonil (Bravo, Echo, Equus, and other products) or mancozeb (Manzate, Dithane, Penncozeb, and others).*
***Omega may be used only on watermelon, muskmelon, honeydew, and specialty melons.*

Table 2. Spray Schedule for Fall Watermelon to Prevent and Manage Downy Mildew, Gummy Stem Blight and Anthracnose

Week	Product
1 (vine run)	chlorothalonil or mancozeb
2	tebuconazole* or Luna Sensation**
3	Zampro + chlorothalonil
4	mancozeb + Cabrio**
5	Gravel
6	Quadris Top*, **
7	chlorothalonil + Ranman
8	chlorothalonil

**Fungicide included to control gummy stem blight.*
*** Fungicide included to control anthracnose.*

Author

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