

Cucurbit Downy Mildew Management for 2018

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The water mold cucurbit downy mildew affects 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 afterwards, are needed to manage this aggressive disease.



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 that enlarge and turn brown. Symptoms on watermelon are quite variable. Sometimes spots are small and yellow and in other cases they are up to ½ inch wide, irregular, and brown. Brownish-purple spores are found in patches on the bottom of infected leaves in the early morning (photo to the right).



New research has identified two strains of cucurbit downy mildew: A1 attacks cucumber and melons, while A2 attacks melons, watermelon, pumpkins, and squashes.

How Cucurbit Downy Mildew Spreads

Cucurbit downy mildew survives over winter on crops growing in southern Florida and Texas, where cucurbits do not freeze. In the spring, wind blows downy mildew spores 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 diseased transplants.

Outbreaks of cucurbit downy mildew are most likely during mild, wet weather. Rain washes spores out of the air onto leaves. Rain, dew, or fog makes infection likely. After infection, downy mildew will continue to spread, even in dry weather, if temperatures are above 60°F.

The Cucurbit Downy Mildew Forecast map (cdm.ipmpipe.org) shows where downy mildew has been reported. The site also predicts where spores will spread from 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 varieties with resistance to downy mildew. Although these cultivars still get disease, it will start later than on susceptible varieties. 'Bristol' is a new slicer with partial resistance.
- Summer squash, zucchini, and acorn squash tolerate some downy mildew. They still produce marketable fruit when diseased.
- Trellising cucumbers does not help manage downy mildew.

Spraying for Cucurbit Downy Mildew

Fungicides are necessary to manage downy mildew.

1. 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. Check the Cucurbit Downy Mildew Forecast map (cdm.ipmpipe.org). Start spraying when downy mildew is found in or near your state.

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- Once the first spray is applied, continue spraying on a 7-day schedule.
- 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.
- Apply fungicides before a predicted rain rather than after it rains. To stick and work, fungicides must be dry on the leaves before rain starts.

Fungicide Programs

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

- Use Program 1 in Table 1 to **prevent** downy mildew.

Table 1. Fungicides Recommended Against Cucurbit Downy Mildew

	Tank mix with protectant*	
	No	Yes
Program 1: Prevent Before symptoms	chlorothalonil, mancozeb, Zampro	Previcur Flex, Curzate
Program 2: Manage After symptoms	Orondis Opti, Orondis Ultra, Gavel	Ranman

*Protectants are chlorothalonil (Bravo, Echo, Equus, and other products) or mancozeb (Manzate, Dithane, Penncozeb, and others).

- Once downy mildew has been found in a field, use different fungicides to **manage** it. Spray at least two of the three fungicides in Program 2 (Table 1) in rotation with each other. Rates and other details are in the *Southeastern U.S. Vegetable Crop Handbook* (<http://www.growingproduce.com/southeasternvegetablecrophandbook/>).
- Rotate** fungicides 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, and Tanos may not always work, so these fungicides are not recommended in South Carolina against cucurbit downy mildew.
- On acorn and summer **squash**, using protectant fungicides may be enough to prevent yield loss from downy mildew.

- In **organic** production, fixed copper fungicides help to prevent cucurbit downy mildew, but only if they are applied before infection. Check with your certifier to see if preventative applications are allowed.
- Orondis Ultra** is not recommended on cucumber or melons, because the A1 strain of cucurbit downy mildew that infects these crops is insensitive to the Revus component (Table 2). Do not use Orondis Gold to manage downy mildew. Do not rotate Orondis products with each other.

Table 2. Special Notes about Foliar Orondis Products

	Cucumber, Muskmelon, Honeydew	Watermelon, Pumpkin, Squashes
Orondis Opti (Orondis + Bravo)	√	√
Orondis Ultra (Orondis + Revus)	DO NOT USE	√

Downy Mildew on Fall Crops

Fall watermelon is at risk from downy mildew. Use the preventative spray schedule in Table 3 for fall watermelon, muskmelon, and cucumber. Add downy mildew fungicides from Table 1 to weeks 1, 3, 5, and 7 if downy mildew is present.



Table 3. Spray Schedule for Fall Cucurbits to Prevent and Manage Downy Mildew, Gummy Stem Blight, and Anthracnose

Week	Product
1 (vine run)	chlorothalonil or mancozeb
2	Ranman + chlorothalonil or mancozeb
3	Quadris Top***
4	mancozeb plus Orondis Opti or Orondis Ultra
5	Switch*
6	Gavel
7	chlorothalonil or mancozeb
8	chlorothalonil or mancozeb + Ranman

*Fungicide included to control gummy stem blight.

** Fungicide included to control anthracnose.

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