

# Cucurbit Downy Mildew Management for 2014

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Cucurbit downy mildew affects most cucurbits (vine crops in the squash family) in South Carolina every year. Downy mildew spreads very quickly, so 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 and spread. Leaf spots on squash and pumpkin (right photo above) are small, bright yellow flecks across the leaf surface. 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/plant\\_prob\\_clinic/index.html](http://www.clemson.edu/public/regulatory/plant_industry/plant_prob_clinic/index.html)), or the Home Garden Information Center ([www.clemson.edu/extension/hgic](http://www.clemson.edu/extension/hgic)).



## How Cucurbit Downy Mildew Spreads

Downy mildews do not survive on crop debris or in soil. They can grow only on live plants. Cucurbit downy mildew survives overwinter in southern Florida and other areas where cucurbits do not freeze.

In the spring, cucurbit downy mildew spreads to newly planted cucurbit crops and reproduces by making spores (fungal “seeds”). Spores are released from infected plants in the morning and spread by air. Wind blows spores northward from the south. Spores move the farthest and fastest during windy, cloudy periods. Spores can be blown 600 miles in 48 hours!

Outbreaks of downy mildew, which is caused by a water mold, are most likely in places with wet, warm weather during the time that spores are moving. Rain washes spores out of the air, and spores land on leaves. Rain, dew, or fog makes infection likely. After infection, downy mildew will continue to get worse even in dry weather.

Cucurbit downy mildew also can be spread if infected transplants are shipped from one area to another. Although this route is not common, it has been seen several times in the past 5 years.

The Cucurbit Downy Mildew Forecast at [cdm.ipmpipe.org/](http://cdm.ipmpipe.org/) shows a map and describes where outbreaks of cucurbit downy mildew have been found. The site also predicts where spores will spread from known sources and where weather will be favorable for a disease outbreak in the next 48-72 hours.

## Cultural Practices to Limit Cucurbit 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 cultivars.
- 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 cucurbit downy mildew.

- 1) When to start spraying is a tricky question to answer, because the time of spore arrival 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 has chlorothalonil or mancozeb in it will give a head start when downy mildew spores blow in.

- 2) Sign up for the Cucurbit Downy Mildew Alert System at [cdm.ipmPIPE.org](http://cdm.ipmPIPE.org) using the link on the left-hand side of the page. You can receive an e-mail or text message sent by the Cucurbit Downy Mildew Forecast team 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) Cucurbits have many leaves that form a very dense canopy. High pressure (minimum 100 psi) and high volume (minimum 100 gallons of water per acre) are needed once vines touch each other.
- 5) Apply fungicides before a predicted rain rather than after it rains. Fungicides must be present on the leaves before spores arrive.

### Fungicide Programs

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

- 1) Program 1 in Table 1 is to prevent downy mildew. Spray before downy mildew is found in a field. The fungicide choices are chlorothalonil, mancozeb, Tanos, Zampro, or Curzate. Tanos and Curzate must be tank-mixed with chlorothalonil or mancozeb.
- 2) Once downy mildew has been found in a field, different fungicides should be used to manage it.

**Table 1. Fungicides Recommended Against Cucurbit Downy Mildew**

Downy Mildew Fungicides	Tank mix with protectant*	
	No	Yes
Program 1: Before symptoms	chlorothalonil, mancozeb, or Zampro	Curzate or Tanos
Program 2: After symptoms	Gavel	Ranman or Previcur Flex

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

### Author

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Spray at least two of the following three fungicides in rotation with each other: Ranman + protectant, Gavel (no protectant needed), or Previcur Flex + protectant (Program 2 in Table 1). Rates and other details are given in the current version of the Southeastern U. S. Vegetable Crop Handbook at [www.thegrower.com/south-east-vegetable-guide](http://www.thegrower.com/south-east-vegetable-guide).

- 3) Rotate fungicide products to reduce the risk of resistance to fungicides. In most parts of the U.S., cucurbit downy mildew is resistant to Ridomil and Revus. It has reduced sensitivity to strobilurin fungicides (Group 11: Cabrio, Quadris, Flint, Pristine, and Reason), Forum, and Presidio. These fungicides are not recommended against cucurbit downy mildew. Tank mixing fungicides specific for downy mildew with protectants also helps prevent fungicide resistance.
- 4) No organic-approved fungicides or biofungicides prevent or control cucurbit downy mildew.

### Downy Mildew on Watermelon

Fall watermelon is at risk from downy mildew, because it spreads quickly in unsprayed crops.

Chlorothalonil and mancozeb provide some protection early in the season, but they are not active enough to stop downy mildew once it starts.

Use the spray schedule in Table 2 for fall watermelon. If downy mildew appears, switch to fungicides from Program 2 (Table 1) when it is found.



**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 Experience*
3	Previcur Flex + protectant
4	mancozeb + Cabrio**
5	mancozeb + Ranman
6	Quadris Top**
7	Gavel
8	chlorothalonil or mancozeb

\*Fungicide included to control gummy stem blight.

\*\* Fungicide included to control anthracnose.