

## Downy Mildew of Cucurbits

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Downy mildew, caused by the fungus *Pseudoperonospora cubensis* probably causes more damage to cucurbits than any other disease in Virginia, particularly during extended periods of cool, moist weather. The disease is generally a problem from mid to late season. Late season symptoms of downy mildew may easily be mistaken for early senescence due to other factors.

### Symptoms

Downy mildew symptoms occur on cucurbit leaves but not other plant parts. The older leaves nearest the center of the hill are usually affected first. On cucumber, the disease first appears as angular, yellow spots on the upper leaf surface. Spots are often bounded by the leaf veins (Fig. 1). During humid weather a grayish growth of the fungus appears on the undersides of these spots. Spores are produced in profusion in these areas. On watermelon and cantaloupe, leaf spots are at first yellow but later appear somewhat darker than the spots on cucumber. Spots enlarge and a general yellowing of the leaf, followed by brown discoloration and, finally, death of the entire leaf occurs. During rainy or humid weather, this progression may occur rapidly. Death of the leaves exposes fruit to sunscald. In some



Fig. 1. Brown, angular spots typical of downy mildew on the upper surface of pumpkin leaves. (Photo by R.L. Wick-U.Mass.)

years the disease may destroy entire plantings of susceptible plants.

### Disease Cycle

The fungus does not overwinter in Virginia, but the spores that cause initial infections are blown in from the southern states along the Atlantic seaboard and other sub-tropical areas where the fungus overwinters. Downy mildew spreads rapidly in moist weather and is destructive over a wide range of temperatures. Extended periods of dry, hot weather tend to suppress spread of the disease. Spores are spread by air currents, rain, or equipment. Symptoms usually appear 4-12 days after infection.

### Control

#### Cultural Control

- Provide adequate plant spacing to reduce the density of the canopy and minimize humidity.
- Avoid overhead irrigation, which lengthens the duration of leaf wetness and favors disease.

#### Chemical Control

- Foliar fungicides, such as chlorothalonil (e.g. Bravo, Daconil 2787) or mancozeb (e.g. Maneb), can be used on a preventative basis every 7 days. Sprays should begin when vines first begin to run.
- In commercial plantings, if downy mildew is already present in the planting, more effective control is achieved by including a systemic fungicide, such as fosetyl-A1 (e.g. Aliette) or mefenoxam (Ridomil Gold), in the spray program. However, it is important not to overapply systemic fungicides as this can lead to the development of fungicide-resistance in the fungal population. An alternating schedule of application in which a systemic + a nonsystemic fungicide, such as mefenoxam + chlorothalonil (e.g. Ridomil

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Gold Bravo) or mefenoxam + mancozeb (e.g. Ridomil Gold MZ), are used one week and a nonsystemic fungicide is used the following week, is recommended to reduce the risk of development of fungicide-resistance in the fungal population. An additional, recently registered systemic fungicide that can be used on an alternating basis with a nonsystemic fungicide is trifloxystrobin (e.g. Flint). Refer to the current issue of the Virginia Pest Management Guide for Home Grounds and Animals (VCE Publication 456-018) or the Commercial Vegetable Production Recommendations (VCE Publication 456-420) for details on chemical control.

## Resistance

- Cucumber cultivars with high levels of resistance to downy mildew have been developed. Watermelon and cantaloupe cultivars generally have low levels of resistance. Resistant cultivars should be used when possible. See Table 1.

**Table 1.**

Cucumber cultivars with resistance to downy mildew

<b>Cucumbers</b>		
<i><b>Pickling</b></i>	<i><b>Slicers</b></i>	<i><b>Burpless Slicers</b></i>
Calypso-F1 <sup>1</sup>	Dasher II-F1	Burpless 26-F1
Carolina-F1	Daytona-F1	Green Dragon
Conquest-F1	Fanfare-F1	Burpless-F1
Eureka-F1	Marketmore 76	Sweet Slice-F1
Fancipak M-F1	Marketmore 86	Orient Express-F1
Lucky Strike-F1	Seneca Longbow-F1	
Wellington-F1	Turbo-F1	

<sup>1</sup> Note: F1 refers to the hybrid generation produced by a cross of two inbred lines. Seed from these plants will not produce plants that are true to type and should not be saved for future plantings.

Refer to the current Virginia Pest Management Guide for Home Grounds and Animals (VCE Publication 456-018), <http://pubs.ext.vt.edu/456-018/>, for details on the proper use of pesticides.

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