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DOWNY MILDEW OF CUCURBITS

In the northeastern United States, downy mildew is an annual, late-season disease of cucurbits which includes cucumbers, melons, squash, pumpkins, and watermelon. It can cause a significant yield losses of these crops in fields and greenhouses when its epidemic starts early in the season.

SYMPTOMS AND DIAGNOSTICS

The disease only affects leaves. Early symptoms of downy mildew on cucumber and squash are light green or yellow leaf sports that are restricted by veins and develop angular necrotic lesions (Fig. 1). The disease starts from the lower part of a plant and spreads to the whole plant when the environment is favorable for disease development. When humid and wet conditions prevail, light gray to dark purple mildew may be noticeable on the lower surface of infected leaves (Fig. 2). This sign can be used to distinguish downy mildew from bacterial leaf spot of cucurbits. As lesions expand and merge together, large leaf areas turn brown and the entire leaf dies.

DISEASE DEVELOPMENT

Downy mildew of cucurbits is caused by a fungus-like organism (also called water mold), *Pseudoperonospora cubensis*. There are many pathotypes that vary in their pathogenicity to various cucurbits. Cucumber and cantaloupe are highly susceptible to certain pathotypes, whereas

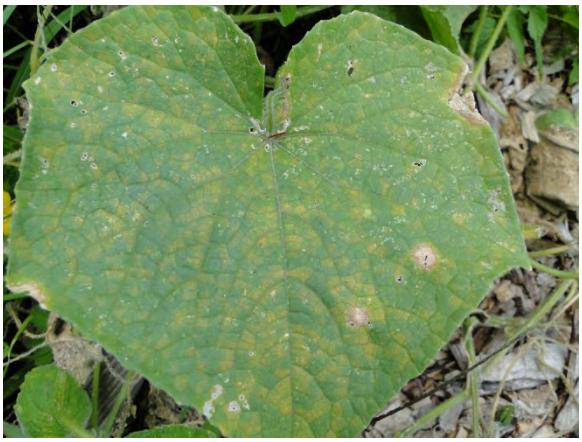

Figure 1. Yellow to light brown spots downy mildew on a cucumber leaf.

Figure 2. Dark gray mildew on the lower surface of infected leaves.

pumpkins and squash tend to be more resistant to them. Since the pathogen can survive only on living tissue of the host plant, the primary source of inoculum in the northeastern United States is from southern areas where cucurbits can grow all year round. Airborne spores (sporangia) can be dispersed via air currents for a long distance and via water splash for a short distance. Optimal conditions for sporulation are periods of at least 6 hours of 100% relative humidity and cool night temperature (between 55°F and 75°F). Spore germination requires 2-6 hours of free water films on leaf surfaces and an optimal temperature between 60°F and 70°F. Therefore, wet and cool weather conditions are favorable to the disease.

MANAGEMENT

Resistant cultivars: Although many cultivars in cucurbit crops have some levels of resistance to downy mildew, no cultivars are completely immune to the disease. Expression of resistance varies with changes of the dominant pathotype in the area. So, relatively resistant cultures may appear to highly susceptible when more virulent pathotypes of *P. cubensis* are introduced in the area.

Cultural practices: Cultural practices that minimize disease include trellising and spacing plants to encourage air circulation, and avoiding overhead irrigation to reduce leaf wetness and reduce disease severities. Since downy mildew of cucurbit is an annual event in fall cucurbit production, planting early-harvest cultivars may lessen the damage and avoid yield losses from the disease epidemics.

Fungicide application: Chemical sprays can be an effective way to control downy mildew on cucurbits if the fungicides are properly applied. To monitor the epidemic of the disease in the United States and to schedule fungicide applications, sign up for the Cucurbit Downy Mildew Alert System at www.cdm.ipmpipe.org/alert. Start fungicide applications when downy mildew of cucurbits is first reported in the state or in neighboring states. Among the fungicides registered for use in Connecticut are chlorothalonil (Bravo), mancozeb (Dithane) phosphorus acid (Fosphite and Alude) and potassium bicarbonate (Armicarb O and Milstop). Most fungicide applications can protect plants from infection, but are unlikely to cure infected plants. For organic growers, *Streptomyces lydicus* (Actinovate AG), *Bacillus amyloliquefaciens* (Double Nickel 55), extract of *Reynoutria sachalinensis* (Regalia), neem oil (Trilogy), and hydrogen dioxide (OxiDate) are registered. Fungicide labels are legal documents, so be sure to read and follow label instructions.

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