Downy Mildew of Cucurbits

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Cause and Symptoms

Downy mildew of cucurbits, caused by the fungus *Pseudoperonospora cubensis,* is found annually on squash, cucumbers, pumpkins, muskmelons, and other cucurbits grown in all areas of Florida. This same disease occurs on watermelons each year in the southern half of the peninsula but, in the northern part of the state, downy mildew on watermelons is severe some years but not others. Although we consider downy mildew of all cucurbits to be caused by the same species, P. *cubensis,* strains within the species seem to exist. For example, it is not uncommon to see squash, cantaloupe, and cucumber severely diseased by downy mildew whereas watermelons nearby show no signs of this disease. *P. cubensis* can kill plants if plants are severely infected early. Downy mildew can reduce yield, fruit quality, and harvesting time. It does so by leaf infections which impair necessary food production in the plant. Late season infections often signal an excuse to buyers for reduced prices because of alleged reduced sugar content in the fruit.

Leaf symptoms can be used to diagnose downy mildew in the field in some cases. On cucurbits other than watermelon, small yellowish areas occur on the upper leaf surface (Figures 1 & 2). Later, a more brilliant yellow coloration occurs with the internal part of the lesion turning brown (Figure 3). Usually the spots will be angular as they are somewhat restricted by the small leaf veins. When the leaves are wet, a downy white-gray-light blue fungus growth can be seen on the underside of individual spots (lesions). On watermelons, yellow leaf spots may be angular (Figure 4) or non-angular, and they will later turn brown to black in color. Often on watermelons an exaggerated upward leaf curling will occur (Figure 4).

Spores of this fungus are produced primarily on the underside of the leaf within the downy growth mentioned earlier. Spores are easily dispersed by wind from one leaf spot to another leaf in your planting or to another planting nearby. Spore movement occurs primarily during late morning to midday. After a spore lands on a leaf and when the leaf is wet, the spore germinates and penetrates the leaf tissue. Within four to seven days, new lesions are produced as a result of infection. Thus, new sites with more spores are produced. As this cycle continues, an epidemic occurs and control becomes increasingly difficult.

Control

Control of downy mildew on cucurbits is achieved primarily by the use of resistant varieties and/ or fungicide spray programs. Fungicide sprays are recommended for all cucurbits. However, resistant varieties are currently available, particularly in cucumber, and allow for fewer spray applications. Squash, pumpkin, cantaloupe, and non-resistant cucumber varieties are very susceptible and should be sprayed every five to seven days. Contact your county Extension agent about recommended fungicides. Spray programs for downy mildew on any cucurbit are most effective when initiated prior to the first sign of disease because once downy mildew occurs in a planting, it becomes increasingly difficult for fungicides to control downy mildew.

Several variables influence the severity of downy mildew. Resistant varieties, as mentioned earlier for cucumbers, minimize downy mildew. If you plant cucurbits near established cucurbit fields with downy mildew, a spray program should be started as soon as the first true leaves are present, because spores from the older field will be blown into the younger field. When nighttime temperatures are between 55 and 75° F. and relative humidity is above 90%, conditions are ideal for infection. Thus fall and spring plantings in South Florida generally have more downy mildew than a winter planting. Furthermore, spring and fall plantings may be infected as early as the appearance of the first true leaves. In North Florida, cooler nighttime temperatures in the spring often delay the onset of downy mildew epidemics until flowering on squash and cucumbers.

Figure 2. Early symptoms of downy mildew on cucumber leaf.

Figure 1. Downy mildew spots on upperside of pumpkin leaf.

Figure 3. Advanced symptoms on cucumber leaf.

Figure 4. Leaf spots and curling on watermelon leaf caused by downy mildew.