

SCOUTING FOR DOWNY MILDEW ON CUCURBIT CROPS

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A few years ago, the most important disease for you to be able to recognize on your cucurbit or vine crops was powdery mildew. Now you must also be able to recognize the first signs of *Plectosporium* blight and downy mildew to successfully grow vine crops.

Downy mildew primarily overwinters on living cucurbit hosts in Florida and other warm areas where host plants can survive year round. Once upon a time, downy relied on storms to move it slowly up the East Coast. Before 2004, it generally arrived in Connecticut in September or October, just before frost, if at all. Although it can completely defoliate a field in as little as 7 to 10 days, it generally arrived too late to damage most Connecticut crops. However, in the last three years downy mildew has arrived in July or August. What changed? One important change involved the proliferation of using transplants to establish cucurbit crops instead of direct-seeding fields. The movement of transplants up the coast in the spring provided an easy springboard for the fungus. Instead of having to blow all the way up from the tropics, state by state, the fungus spores may only have to travel from New Jersey or from another adjacent state where southern-grown transplants are used. It is now important to scout for downy mildew on a weekly basis, and to be able to recognize the disease when it first infects the plants, so that you can respond with the appropriate fungicide in time to save your crop.

You might be thinking that you'll just spray on a regular basis and skip the scouting. There are many good reasons why preventative applications are not practical. Like powdery mildew, downy mildew has a history of developing resistance to fungicides very quickly. That means it is crucial to practice resistance management by constantly alternating between materials to help keep them effective. Another complication is that each year, a different race of the downy mildew fungus arrives that is more destructive to one or two specific cucurbits than to others, and is resistant to a different set of fungicides. For instance, in 2004 the strain of downy mildew that arrived in Connecticut in late July was much more severe on pumpkins than other cucurbits and did not respond to Cabrio applications. In 2005, August brought a strain that seemed to infect cucumbers exclusively. The 2005 strain was resistant to many common fungicides, and even attacked resistant cucumber varieties. So, whichever fungicide(s) you choose to apply on a regular basis may be the wrong fungicide to control the current year's race. Another problem is that downy mildew is a water mold, similar to *Phytophthora* and *Rhizoctonia*. In most cases, you need a completely different set of fungicides to control downy mildew than for most other common cucurbit diseases, such as powdery mildew, *Plectosporium* blight, black rot, scab, *Alternaria*, and angular leaf spot. It simply would not be cost effective to attempt to apply the combination of fungicides that would be needed to control the whole disease complex all summer long in a preventative manner. So, we scout!

First, look for yellow polka-dots

On the older leaves of pumpkins, winter squash, and mature summer squash, the first symptom of downy mildew is the appearance of pale, yellow spots on the upper leaf surface (Fig. 1 & 2). On cucumbers and younger summer squash, the spots are better described as pale yellow patches (Fig. 3 & 4).



Figure 1. Yellow spots caused by downy mildew on a mature summer squash leaf



Figure 2. Yellow spots caused by downy mildew on a mature pumpkin leaf



Figure 3. Yellow patches caused by downy mildew on a cucumber leaf



Figure 4. Yellow patches caused by downy mildew on a young summer squash leaf

The leaf tissue turns brown and dies around the yellow spots/patches, and the resulting necrotic lesions are bordered by small leaf veins, giving the whole leaf a mosaic appearance (Fig. 5 & 6).



Figure 5. Mosaic appearance of necrotic lesions caused by downy mildew on a cucumber leaf



Figure 6. Mosaic appearance of necrotic lesions caused by downy mildew on a pumpkin leaf

If you are scouting just after a leaf wetness period of 6 hours or more (i.e. after a heavy morning dew or rain) and the temperatures are between 59 and 68 degrees F, then you may see masses of fuzzy dark spores on the underside of the lesions (Fig. 7). However, the spores are not present on warm, sunny days.



Figure 7. Masses of fuzzy dark spores on the underside of lesions caused by downy mildew on cucumber

Next, the older leaves near the base of the plant begin to curl at the edges (Fig. 8). This leaf curling quickly spreads to the younger leaves further out on the vine and the plant begins to die. Sometimes instead of curling, leaves simply droop at the edges and die (Fig. 9). By the time young leaves start dying, you have either sprayed your field with an effective fungicide or you have lost your field. Of course, if downy mildew arrives in September, most pumpkins and winter squash are usually full-sized, and fields do not need to be protected since this disease affects leaves and not fruit. A little more sunshine on the fruit in September can actually help the fruit mature and color up.



Figure 8. Leaf curling on a cucumber plant infected with downy mildew



Figure 9. Leaf drooping and dieback on cucumber plants infected with downy mildew

Fungicides

As mentioned earlier, a fungicide that controls downy mildew one year may not be effective on a new race of the disease that arrives the second year. Therefore, it is critical to be able to respond quickly with a spray upon finding the disease, and possibly with a second fungicide within a week if it looks like the first material is not working. Cabrio did not work on pumpkins in Connecticut in 2004; Cabrio, Amistar (Quadris), Flint and Bravo did not work on cucumbers in 2005; all registered fungicides seemed to work on all cucurbits in 2006. Here is a list of some registered fungicides that can be effective, depending upon which race arrives in the state in a given year:

Trade Name	common name of active ingredient (resistance management group)
Ridomil Gold Bravo	mefenoxam (4) + chlorothalonil (M4)
Curzate	cymoxanil (27), must be applied with a protectant (i.e. maneb)
Tanos	cymoxanil (27) + famoxadone (11)
ProPhyt, Phostrol, Fosphite	phosphoric acid (33)
Previcur Flex	propamocarb (28)
Ranman	cyazofamid (21)
Forum	dimethomorph (15)
Pristine	pyraclostrobin (11) + boscolid (7)
Cabrio	pyraclostrobin (11)
Amistar	azoxystrobin (11)
Flint	trifloxystrobin (11)
Bravo	chlorothalonil (M4)
Maneb	copper hydroxide or copper sulfate (M1)

Alternative Management Practices

Use resistant varieties if available. Most cucumber varieties and a few muskmelon varieties are resistant or tolerant to downy mildew; no squash varieties are resistant to downy mildew, although the summer squash variety Sunray has shown some tolerance to the disease. Increase space between plants to help increase air circulation and minimize leaf drying time. Make late-season or long season plantings in sites with good air drainage where winds can reduce leaf wetness periods. If possible, separate successive plantings into distant fields to help slow disease spread.

References

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