



Downy Mildew: Sporulation and Susceptibility

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DESCRIPTION

Downy mildew denotes to any of several types of oomycete microbes that are obligate parasites of plants. Downy mildews absolutely belong to *Peronosporaceae*. In commercial agriculture, they are an individual problem for growers of crucifers, grapes and vegetables that grow on vines. The prime example is *Peronospora farinosa* presented in NCBI-Taxonomy HYP3. This pathogen does not yield survival structures in the northern states of the United States, and overwinters as live mildew colonies in Gulf Coast states. Yield loss allied with downy mildew is most likely related to soft rots that occur after plant canopies collapse and sunburn occurs on fruit. Cucurbit downy mildew only distresses leaves of cucurbit plants.

Initial symptoms comprise large, angular or blocky, yellow areas visible on the upper surface. As lesions mature, they multiply rapidly and turn brown. The under surface of infected leaves appears water soaked. Upon closer scrutiny, a purple-brown mold becomes apparent. Small spores shaped like footballs can be observed midst the mold with a 10x hand lens. In disease-favorable conditions (cool nights with long dew periods), downy mildew will range rapidly, destroying leaf tissue without affecting stems or petioles.

Because the downy mildew pathogen does not vegetate in Midwestern fields, crop rotations and tillage practices do not affect disease development. The pathogen tends to become conventional in late summer. Therefore, planting early season varieties may further diminish the already minor threat posed by downy mildew.

Fungicides applied specifically for downy mildew control may be redundant. Broad spectrum protectant fungicides such as

chlorothalonil, mancozeb, and fixed copper are at least somewhat operative in protecting against downy mildew infection. Systemic fungicides are labelled for practice against cucurbit downy mildew, but are recommended only after diagnosis of this disease has been confirmed. In the United States, the Environmental Protection Agency has permitted oxathiapiprolin for use against downy mildew. One way to control downy mildew is to eradicate moisture and humidity around the impacted plants. Watering from below, such as with a drip system and advance air circulation through selective pruning. In bounded environments, like in the house or in a greenhouse, falling the humidity will help as well. Recent breeding efforts have produced resistant basil cultivars.

CONCLUSION

Downy mildews are generally chosen by cool temperatures (15°C - 23°C = 58°F - 72°F) and relative humidity above 85% at the leaf surface. While some downy mildews subsist from year to year locally in plant debris, in the soil, or on weeds, others do not survive in cold climates and must be blown back to our region from southern climates each spring. Species of downy mildews generally reproduce sexually *via* oogonia and antheridia and asexually *via* sporangia. From the time of infection till new spores form can be as short as 4 days but is usually 7-10 days. In all species, the sporangia germinate straight by forming a germ tube that penetrates the plant. In some species (*Sclerospora* and *Plasmopara*), sporangia can also germinate incidentally by releasing zoospores. *Peronospora*, *Pseudoperonospora*, and *Bremia* rarely if ever form zoospores.

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