

Impatiens Downy Mildew¹

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Downy mildew on impatiens is of great concern throughout Florida. Winters in south Florida provide high humidity paired with cool nights, creating ideal conditions for disease development. Downy mildews are caused by several different species of pathogens that tend to be plant-host specific. *Plasmopara obducens* is the pathogen that affects impatiens. Some literature indicates that nighttime temperatures of about 50 to 72°F favor downy mildew, but the disease has been reported on impatiens year round in south Florida.

Hosts

Downy mildew affects all hybrids and varieties of *Impatiens walleriana* (gardening impatiens), also called busy Lizzie. Other species of impatiens that are susceptible include *Impatiens balsamina* (balsam impatiens, garden balsam and rose balsam) and native wild impatiens *Impatiens pallida* and *I. capensis* (Jewelweed). There is currently no evidence for seed-borne transmission of the downy mildew pathogen on impatiens. Note that New Guinea impatiens, *Impatiens x hawkeri*, are considered very tolerant and the disease is yet to be reported on this host in Florida.

Symptoms

Young plants and new growth are most susceptible and typically show symptoms first. Initially, leaves may look a little yellowish or speckled (Fig 1). In fact, these symptoms

can look very similar to nutritional deficiencies. Faint gray lines may be seen on the tops of leaves, or leaf edges may curl downward (Fig 2). Sometimes the yellowing is not visible before leaf curling begins.



Figure 1. Leaves may look a little yellowish or speckled.
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Figure 2. Faint gray lines may be seen on the tops of leaves, or leaf edges may curl downward.

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As the disease continues to progress, whitish, downy-looking growth is visible on the undersides of leaves (Fig 3). This whitish growth consists of spore-containing structures that have emerged from the lower leaf pores (stomata). Next, leaves and flowers will drop quickly, leaving mostly stems (Fig 4).



Figure 3. As the disease continues to progress, whitish, downy-looking growth is visible on the undersides of leaves.

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Life Cycle of the Pathogen

The pathogen that causes downy mildew is a type of water mold and more closely related to algae than to fungi. Other similarly classified pathogens include *Phytophthora* and *Pythium* spp. Downy mildew pathogens can spread by two different types of spores. One type, zoospores, moves through water. Sporangia that contain and can release zoospores are easily windborne. This explains why this disease is spread by splashing overhead irrigation, rainfall, and wind. The

other type of spore, the oospore, forms inside plant tissues, where the pathogen can survive for years. Downy mildew is very aggressive and can rapidly spread, so action should be taken quickly if it is found.



Figure 4. Eventually, leaves and flowers will drop, leaving mostly stems.

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Nursery Management

It is critical that high levels of sanitation be maintained in the nursery. Plugs or any other *Impatiens walleriana* plants brought into the nursery should be carefully inspected and rejected if they appear diseased. Hard surfaces in the growing area between crops should be sanitized with quaternary ammonia compounds (e.g. Greenshield, KleenGrow, etc). All impatiens plant tissue should be removed between crops and should not be composted. Plant debris should be disposed of in dumpsters that are emptied offsite.

Frequent scouting for this pathogen should be conducted, especially as evening temperatures cool. High relative humidity in Florida makes downy mildew extremely difficult to control. Plants should be spaced to allow as much air movement between them as possible to hasten leaf drying after irrigation or rainfall.

If affected plants are detected, they should be quickly removed and any fallen leaves and flowers from growing areas should be disposed of offsite. Treat remaining plants with preventive fungicides as indicated in Table 1. Wash hands thoroughly after handling problematic plants and before handling non-affected impatiens.

Landscape Management

This pathogen may erupt under high humidity, cool temperatures, and overcrowding. Overcrowding reduces the wind movement between plants that helps leaves to dry

more quickly. Prevention is the only effective management strategy against downy mildew. Elimination of overhead and nighttime watering, excessive fertilization, overcrowded planting beds, and other stresses on the plants would all be very helpful in avoiding or reducing occurrence of this pathogen. However, our tightly arranged mass planting practices in the landscape, coupled with whole-farm irrigation systems and periodic rainfall often make ideal conditions difficult to achieve. Inspect impatiens leaves and stems before purchasing plants for the landscape and before installing them, and reject any affected plants. Scouting will not entirely eliminate the risk of downy mildew because windborne spores can still infect healthy plants, but it is always better to avoid introducing the pathogen to the landscape on new plant materials.

Impatiens showing early symptoms of downy mildew should be removed and thrown away offsite, and any surrounding impatiens should be treated with a protective fungicide. When pulling out an infected impatiens landscape planting, attempt to remove as much plant tissue as possible from the planting bed, which will help to reduce inoculum of the pathogen (e.g. oospores). Consider replacing heavily diseased plantings of impatiens with another bedding plant species that is not susceptible to downy mildew.

Fungicide Resistance Management

Resistance to a fungicide occurs when a pathogen develops a genetic mutation at the target site that reduces its sensitivity to a specific fungicide. Using a single fungicide repeatedly over time suppresses only the portion of the pathogen population sensitive to that fungicide, with the result that only the resistant portion of the population remains. This population will go on to reproduce and become the majority. Eventually, the fungicide becomes ineffective because the majority of the population is no longer susceptible to it. If a pathogen is resistant to a fungicide, it is usually resistant to all fungicides in that class.

To minimize the potential for fungicide resistance, the Fungicide Resistance Action Committee (FRAC) provides codes to facilitate proper rotation of chemical families that have similar modes of action. FRAC codes make proper fungicide rotation easy and are included with the chemical recommendations in this fact sheet (Table 1). When purchasing fungicides for managing downy mildew, fungicides with different FRAC codes should be selected and the manufacturer's label followed.

Non-Commercial Homeowner Recommendations

The landscape management recommendations described above should be followed and the fungicides listed in Table 2 can be used.

For the management of downy mildew in the nursery and landscape, professional use fungicides are listed in Table 1.

Table 1. Fungicides for use in managing downy mildew by commercial operations.

Products (active ingredients)	FRAC Group ²	Use ¹
Subdue Maxx (mefenoxam)	4	N, L & G
Fenstop (fenamidone) Compass (trifloxystrobin) Disarm (fluoxastrobin) Heritage (azoxystrobin) Pageant Intrinsic (pyraclostrobin + boscalid)	11	G N, L & G N, L & G N, L & G N, L & G
Segway (cyazofamid)	21	N, L & G
Aliette (fosetyl-Al) Alude (potassium salts of phosphorous acid) Fosphite Fungicide (potassium phosphite)	33	N, L & G N, L & G N, L & G
Micora (mandipropamid)	40	N & G
Orvego (ametoctradin + dimethomorph)	45 + 40	N & G
Adorn (fluopicolide)	43	N, L & G
Cease or Rhapsody (<i>Bacillus subtilis</i> strain QST 713) Double Nickel (<i>Bacillus amyloliquefaciens</i> strain D747)	44	N, L & G
Badge (copper hydroxide + copper oxychloride) Champ (copper hydroxide) COC (copper oxychloride) Cuprofix Ultra 40 Disperss (basic copper sulfate)	M1	N, L & G N & G N, L & G N, L & G
Protect (mancozeb)	M3	N, L & G
¹ N= Nursery; L= Landscape; G= Greenhouse ² Fungicides within the same group (with same numbers or letters) indicate same active ingredient or similar mode of action. Additional Control: Actinogrow (<i>Streptomyces lydicus</i> WYEC 108), Soilguard (<i>Gliocladium virens</i> G1-21), Sporatec (clove oil+rosemary oil+thyme oil) and Trilogy (neem oil) may also provide protection against some forms of downy mildew in Florida landscapes, nurseries and greenhouses when applied prior to infection.		

Table 2. Fungicides for use in managing downy mildew in home landscapes

Non-Commercial Homeowner Products
Concern Copper Soap Fungicide (copper octanoate)
Ferti-lome Broad Spectrum Landscape and Garden Fungicide, Ortho Max Garden Disease Control (chlorothalonil)
Monterey Agri-Fos (phosphorous acid)
Southern Ag Liquid Copper Fungicide (copper ammonium complex)
Southern Ag Triple Action Neem Oil (extract of neem oil)
Remember, the label is the law; be sure to use products only in a manner consistent with the manufacturer directions on the labels. Please use pesticides safely.