



## Impatiens Downy Mildew

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### Introduction

Downy mildew diseases occur on several herbaceous plant species, but they do not typically cause severe problems in Virginia landscapes. In the summer of 2012, however, landscape plantings of common garden impatiens (*Impatiens walleriana*) (fig. 1) in many parts of Virginia and other eastern states were devastated by a new downy mildew, impatiens downy mildew (fig. 2).

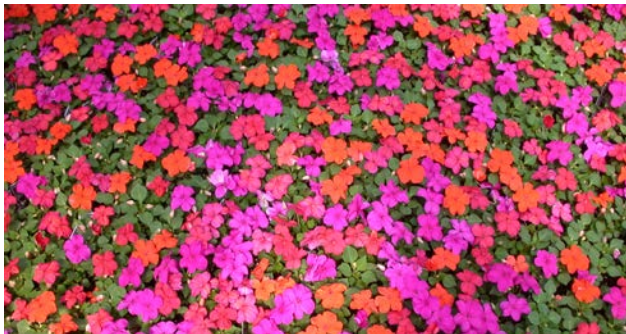


Fig. 1. Healthy *Impatiens walleriana*. (Photo by B. Whipker)

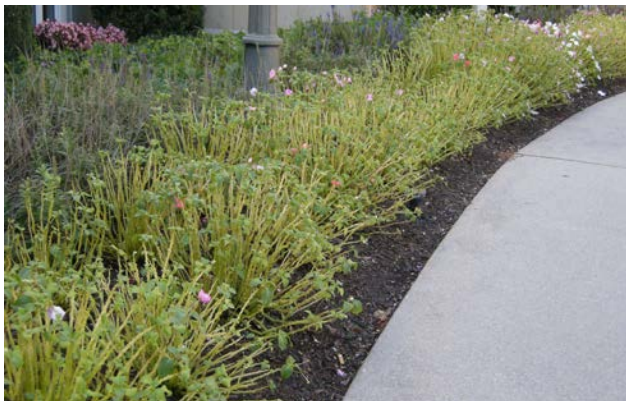


Fig. 2. Defoliation of *Impatiens walleriana* caused by impatiens downy mildew. (Photo by M. A. Hansen)

The impatiens downy mildew pathogen first became widespread in landscapes in 2011 in New England, the Midwest, Florida and California. Prior to 2011 it had been detected only sporadically in commercial greenhouses and in isolated landscape settings in New York. The rapid decline of mass plantings of diseased impatiens in 2012 has raised awareness of this serious disease of a commonly grown annual bedding plant.

### Symptoms and Signs

Symptoms and signs of impatiens downy mildew may include:

- Downward leaf curl
- Leaf yellowing or stippling
- White sporulation of the pathogen on lower leaf surface
- Defoliation and flower drop, leaving bare stems
- Stem rot

Symptoms of impatiens downy mildew vary, depending on when plants are infected. Plants infected early in development or those that are propagated from systemically infected cuttings exhibit stunting and/or subtle yellowing, symptoms that can easily be overlooked (fig. 3). Plants infected later in development typically exhibit late-season leaf yellowing and defoliation, which ultimately leave behind a cluster of leafless, flowerless stems: the so-called “green stick” or “sea urchin” syndrome (fig. 4). Prior to

defoliation, leaves may curl downward (fig. 5) or appear light green, stippled, or have gray markings. These symptoms can also be easily overlooked. During cool, moist weather the pathogen produces white sporangia that are diagnostic for the disease on the lower leaf surface (fig. 6); however, sporangia are not always present. In later stages of the disease, stems develop a watery rot and collapse.



Fig. 3. Early symptoms of leaf yellowing caused by the impatiens downy mildew pathogen, *Plasmopara obducens*. (Photo by E. Bush)



Fig. 4. "Sea urchin"-look to plants defoliated by impatiens downy mildew. (Photo by M. A. Hansen)



Fig. 5. Downward leaf curl and yellowing. (Photo by M. A. Hansen)



Fig. 6. Layer of white sporangia on lower leaf surface of plant infected with impatiens downy mildew. (Photo by M. A. Hansen)

## Disease Cycle

Impatiens downy mildew spreads mainly in three ways:

- Propagating infected plants
- Wind-blown or water-splashed sporangia
- Transplanting healthy plants into infested soil

Impatiens downy mildew is caused by the oomycete, *Plasmopara obducens*. The pathogen grows systemically in the plant and reproduces by means of sporangia, which form on the lower leaf surface under cool,



moist conditions. Sporangia are easily spread short-distance by air currents or splashing water and they may also travel long-distance on wind currents to new locations. Because sporangia may not be produced until 5 to 14 days after the plant is initially infected, asymptomatic plants may mistakenly be assumed to be disease-free.

The pathogen may also produce thick-walled resting structures called “oospores” in infected stems. Oospores can survive for long periods in soil and can infect healthy impatiens planted into infested soil. It is not known how long the oospores of this particular species of downy mildew can survive, but oospores of other downy mildew species have been shown to survive for 8-10 years in infested soil, so planting impatiens in beds where impatiens downy mildew has been diagnosed in the past is not recommended. Also, prompt removal of plants that have been diagnosed with impatiens downy mildew is recommended to reduce the risk of infesting soil with oospores.

## Control

Prevention is the key to disease control in both the greenhouse and the landscape. Effective disease control in the commercial greenhouse involves both cultural and chemical means. Home growers must rely on avoidance tactics and cultural control measures if they choose to plant common garden impatiens.

### Cultural Control

#### *Commercial Greenhouses*

- Start with clean plant material by purchasing impatiens plugs, cuttings, or plants only from reputable sources.

- Do not carry over impatiens in the greenhouse from one growing season to the next.
- Minimize humidity and periods of leaf wetness, which favor the disease.
- Be aware of what is growing outside the greenhouse in your area. If impatiens is growing outdoors in the vicinity of your greenhouse, sporangia may blow into the greenhouse from infected plants and a preventive fungicide program should be implemented.

### *Landscape*

- If you choose to plant *Impatiens walleriana*, avoid overhead irrigation in the late afternoon or evening. Watering late in the day prolongs leaf wetness and favors disease development.
- Bag and remove infected plants and plant debris promptly after the disease is diagnosed to avoid introducing oospores, which may overwinter in soil, to the bed.
- Do not compost infected plant material.
- Do not plant *I. walleriana* into beds with a known history of the disease.
- Plant species other than *I. walleriana* to avoid the disease altogether (see list of alternative plants below).

### Chemical Control

#### *Commercial Greenhouses*

- Impatiens downy mildew is difficult to control once plants are infected, so fungicides should be applied preventatively.
- Apply fungicides preventatively at label rates and intervals, taking care

to rotate among products with different modes of action (i.e. fungicides with different [FRAC](#) codes). Examples of recommended fungicide treatment programs can be found at the American Floral Endowment web site

(<http://www.endowment.org/images/stories/research/imp%20dm%20program%202.pdf>).

- In recent research trials, an initial drench treatment with mefenoxam + fluopicolide (Subdue Maxx® + Adorn®), followed by regular foliar fungicide spray applications at 1 to 2-week intervals using other chemistries, was superior to using foliar spray applications alone for disease control.
- In research trials, plants treated in the greenhouse as described above (initial drench treatment, followed by foliar sprays) and transplanted to landscape beds remained symptom-free longer than plants that had not received the initial drench treatment.

### **Landscape**

- An effective fungicide treatment program in the greenhouse will have a carryover effect in the landscape bed and can continue to protect plants from the disease for up to four weeks.

- Fungicide use for controlling impatiens downy mildew in the landscape is not recommended at this time. Although some fungicides are labeled for control of downy mildews in residential landscapes, impatiens downy mildew is very difficult to control in the landscape.

### **Resistance**

All cultivars of *I. walleriana* and hybrids that have an *I. walleriana* parent (e.g. Fusion®, Fiesta®, Patchwork® and Butterfly® impatiens) are susceptible to impatiens downy mildew. *I. balsamina* (balsam impatiens) and *I. glandulifera* (Himalayan balsam) are also susceptible, but the latter is rarely produced horticulturally. Some native and weedy impatiens, including pale touch-me-not (*I. pallida*) and jewelweed (*I. capensis*), are also susceptible. New Guinea impatiens (*Impatiens hawkeri*) is resistant to the disease.

### **Alternative Plants for Landscape Beds**

Because impatiens downy mildew is so destructive to common garden impatiens and because control options are limited for home landscapes, home growers and landscapers should consider alternative species of annuals for landscape beds. (Refer to Table 1).

**Table 1. Alternative plants for landscape beds.**

	<b>Garden height (inches)</b>	<b>Garden spacing (inches)</b>	<b>Notes on use</b>
<b>Flowering annuals</b>			
Begonias			
Rex hybrids	8 to 12	8 to 10	Shade, foliage and flower
Reiger, hiemalis	10 to 14	10 to 12	
Hybrids (winged, landscape and trailing types)	10 to 34 depending on type	10 to 36 depending on type	
Browallia (Sapphire flower)	10 to 14	10 to 12	Trailing habit, purple flowers
Fuchsia	Varies with cultivar		Full sun to partial shade, choose upright cultivars; some are winter hardy in Virginia
<i>Impatiens hawkeri</i> (New Guinea impatiens)	10 to 16	10 to 16	Shade, better in containers
SunPatiens® (Impatiens hybrid)	Varies with cultivar and type		Part shade or full sun, trailing, compact or vigorous; better landscape plant than New Guinea Impatiens
Lobelia species (Lobelia, cardinal flower)	24 to 60	18 to 24	Partial shade; great hummingbird plant; perennial <i>Lobelia cardinalis</i> also available
Lobularia (Sweet alyssum)	4 to 8	12 to 24	Mat forming; sun to part sun; 'Snow Princess' more heat tolerant
Nicotiana (Flowering tobacco)	36 to 40	15 to 18	Full sun or partial shade
<i>Salvia farinacea</i> . (Mealycup sage)	18 to 24	9 to 12	Sun to partial shade
Torenia (Wishbone flower)	6 to 12	6 to 9	Partial shade
<b>Foliage annuals</b>			
Alternanthera (Joseph's Coat)	6 to 12	6 to 18	Shade
Caladium	12 to 30		Shade, many colors and sizes
Coleus	8 to 32	8 to 24	Full sun to full shade; many new cultivars
Dichondra (Silver Falls)	3 to 6	36 to 38	Shade, groundcover
Hypoestes (Polka dot plant)	12 to 18	9 to 12	Full sun to partial shade
Ipomoea (Sweet potato vine)	4 to 8	24 to 36	Sun to partial shade, trailing
Plectranthus (Swedish ivy)	24 to 36	18 to 24	Sun to partial shade

## Current Outlook

The greenhouse industry is very aware of impatiens downy mildew and has taken steps to ensure that plants are treated preventatively for this disease in the

greenhouse. In time, researchers may develop resistant cultivars or hybrids of *Impatiens walleriana*.

## Resources for Information on Impatiens Downy Mildew:

Catlin, N. "Downy Mildew of Impatiens: Some (but not all) Questions Answered". e-GRO Alert Vol. 1, Nr. 8. Mar. 2012. Web. <[http://e-gro.org/pdf/Bulletin\\_1-8\\_Impatiens\\_Downy\\_Mildew.pdf](http://e-gro.org/pdf/Bulletin_1-8_Impatiens_Downy_Mildew.pdf)>

"Controlling Impatiens Downy Mildew on *Impatiens walleriana*". American Floral Endowment. Web. <<http://www.endowment.org/afe-news/press-releases/221-controlling-downy-mildew-on-impatiens.html>>

"Impatiens Downy Mildew Information". Cornell Cooperative Extension Floriculture Program. Web. <<http://ccesuffolk.org/floriculture-program/>>

Rechcigl, N. and Warfield, C. "Impatiens Downy Mildew : Looking Ahead to 2013". The Knowledge Center. Webinar. <<http://www.anla.org/knowledgecenter/premium/index.cfm?view=player&colid=112&cid=364&mfid=5473&StartNum=1>>

Warfield, C. "Everything You Need to Know about Impatiens Downy Mildew". Greenhouse Grower. 3 Dec. 2012. Web. <<http://www.greenhousegrower.com/article/32104/everything-you-need-to-know-about-impatiens-downy-mildew>>

Warfield, C. "Impatiens Downy Mildew: Guidelines for Growers". Ball Horticulture Co. Jan 2013. Web. <<http://www.ballhort.com/pdf/ImpatiensDownyMildewGrowerGuidelines.pdf>>