

Downy Mildew of Impatiens – Some (But Not All) Questions Answered

Nora Catlin, Floriculture Specialist, Cornell Cooperative Extension of Suffolk County

One of the diseases that many are talking about this season is downy mildew of impatiens. Fortunately, there have been no reports of impatiens downy mildew in northeast greenhouses in 2012, but there have been reports from greenhouses and landscapes in Florida. We all have a lot of questions about this disease. Will we see it again in local landscapes in 2012? Will it overwinter in areas where it was found in 2011? Will it be a greenhouse problem this year? Can we manage it? Unfortunately, this is a new disease problem for our industry and there are many uncertainties.

However, we do know a few things:

This downy mildew is caused by *Plasmopara obducens*.

Downy mildew diseases are caused by fungus-like organisms called oomycetes or water molds and are closely related to *Pythium* and *Phytophthora*. The

downy mildew that has been recently affecting impatiens in our industry is caused by *Plasmopara obducens*.

This downy mildew affects *Impatiens*.

All seed- or vegetatively-propagated *Impatiens walleriana* (including double impatiens and mini-impatiens) and any *I. walle-*

riana interspecific hybrids (such as Fusion® impatiens) are considered susceptible. *P. obducens* has also been reported on *I. balsamina* (commonly known as balsam impatiens, garden balsam, or rose balsam), as well as some native wild impatiens, *I. pallida* and *I. capensis*, commonly known as jewelweeds. *I. glandulifera* (Himalayan balsam



Chlorosis and leaf drop symptoms of downy mildew. (Photo: Margery Daughtrey)



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CONTRIBUTORS

Dr. Nora Catlin
Floriculture Specialist
Cornell Cooperative Extension -
Suffolk County
nora.catlin@cornell.edu

Dr. Brian Krug
Floriculture Ext. Specialist
Univ. New Hampshire
brian.krug@unh.edu

Dr. Roberto Lopez
Floriculture Extension Specialist
& Research
Purdue University
rglopez@purdue.edu

Dr. Brian Whipker
Floriculture Extension & Research
NC State University
brian_whipker@ncsu.edu

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or policeman’s helmet), which is occasionally produced horticulturally and known to be an invasive plant in some areas, is also a reported host.

New Guinea impatiens (*I. hawkeri*) and interspecific hybrids such as SunPatiens® appear to be tolerant to this disease. It is unknown if other horticultural *Impatiens* are susceptible. No other bedding plants are reported to be hosts of this downy mildew, although they can be hosts of other downy mildews. (For example, coleus is susceptible to downy mildew caused by *Peronospora* sp., but not to downy mildew caused by *P. obducens*).

Scouting your greenhouse crops of *Impatiens walleriana* is important.

Identifying the disease as early as possible is critical in achieving management; management should

focus on prevention. Vigilantly check incoming shipments of plants and regularly check your crops in the greenhouse.

What to look for:

Early symptoms can be very subtle. Look for a slight stippling or chlorosis of the leaves. These symptoms might appear similar to a nutritional deficiency or spider mite injury. Leaves can exhibit a slight flagging or curling downward, sometimes giving the appearance that the plants need to be watered. Under the right conditions, you will see white-colored sporulation on the undersides of the foliage. Sporulation will not always be present, and won’t likely be observable in warm and dry conditions. In advanced stages, plants will appear stunted, can drop their leaves and flowers, and collapse. Contact your local extension specialist or diagnostic lab for assistance with diagnosis.



Leaves showing various levels of leaf curl and sporulation. (Healthy on left, downy mildew on three leaves on right.) (Photo: Margery Daughtrey)

In cooperation with our local and state greenhouse organizations





Leaf drop and plant collapse symptoms of downy mildew.
(Photo: Margery Daughtrey)

Impatiens downy mildew is spread via infected plants, water, or wind.

Downy mildew can be brought into a greenhouse, or moved around within a greenhouse operation, via infected plants. Downy mildew can also be spread by water splash and by wind-dispersal from infected plants in the greenhouse or nearby landscapes.

There is currently no evidence that this downy mildew is seedborne.

Though some downy mildews can be seedborne, there is currently no evidence that *P. obducens* is transmitted through seed.

Oospores can be formed in plant tissue.

Oospores have been found in stem tissue from landscape im-

patiens in various regions. Oospores are thick-walled spores that are known to help pathogens similar to *P. obducens* survive winters, however we are not yet certain if and under what conditions *P. obducens* will be able to survive overwinter. If downy mildew was identified or symptoms were seen in a landscape bed in 2011, it would be prudent to plant the landscape with plants other than *I. walleriana*. For these areas, recommend that your customers plant alternatives such as New Guinea impatiens, coleus, begonia, or other suitable plants.

Downy mildew likes cool and wet conditions.

Downy mildew thrives in moist or humid and cool conditions. New infections will occur under conditions that create long periods of

leaf wetness (4 hours or longer).

Some cultural practices can help manage downy mildew:

Focus on prevention and early identification. Be familiar with symptoms and inspect all incoming plants and regularly scout crops.

Manage humidity and leaf wetness. Aim for a RH of 85% or less and leaf wetness periods of 4 hours or less. Provide good air circulation with vents, fans, and appropriate plant spacing. Use smart irrigation practices – avoid overhead irrigation where possible, water early in the day so that the foliage dries quickly, and avoid irrigating in cloudy and cool conditions. Try to avoid large swings in temperature that can result in condensation on the foliage, and heat and vent greenhouse air to lower humidity, if necessary.

Step up your sanitation practices. Start with disease-free plants and stock plants. Clean up plant debris between crops and at the end of the season and sanitize. Remove infected plants, as well as nearby *Impatiens* spp. plants (within ~3ft radius). When removing infected plants or plant debris, immediately bag and remove from the greenhouse to avoid spreading the disease. Do not compost infected plants.

Keep plants separate. Keep impatiens plants from different sources separate, and keep seed-propagated plants separate from cutting-propagated plants.

Chemicals that can help manage downy mildew:

The following chemicals are labeled for management of downy mildew on impatiens:

Active Ingredient	Some Examples of Trade Name(s)	FRAC Code	Activity
mefenoxam	SubdueMAXX, Quali-Pro Mefenoxam	4	systemic
azoxystrobin	Heritage ^a	11	systemic
fluoxastrobin	Disarm O	11	locally systemic / translaminar
fenamidone	Fenstop	11	systemic
pyraclostrobin ^b	Insignia	11	locally systemic / translaminar
pyraclostrobin+boscalid ^b	Pageant	11	locally systemic / translaminar
trifloxystrobin	Compass O	11	locally systemic / translaminar
polyoxin D zinc salt ^c	Affirm, Veranda O	19	systemic
cyazofamid	Segway	21	locally systemic / translaminar
mono- and di-potassium salts of phosphorous acid	Vital, Alude, Fosphite, Rampart	33	systemic
fosetyl-Al ^d	Aliette, Avalon, Flanker	33	systemic
fluopicolide	Adorn	43	systemic
dimethomorph	Stature	40	locally systemic / translaminar
copper materials ^{c, e}	Phyton 27	M1	contact
mancozeb	Protect DF	M3	contact
<i>Streptomyces lydicus</i> ^c	Actinovate	NC	biological

^a 2(ee) label includes downy mildew management on bedding plants

^b warning regarding safety on open flowers

^c no efficacy tests on impatiens downy mildew have been reported as of yet

^d so far poor results observed in research trials

^e beware of incompatibilities with mono- and di-potassium salts of phosphorous acid and fosetyl-Al materials

Note that the products listed above are not labeled for use in all states and might not be labeled for or appropriate to use in the landscape. As always, make sure to follow all label recommendations and restrictions and to rotate between chemicals with different modes of action, or FRAC (Fungicide Resistance Action Committee) Codes. If not rotating at every application, pay attention to spray intervals (minimum varies from 7d – 28d) as well as allowable numbers of consecutive treatments.

Margery Daughtrey (Cornell University) and Mary Hausbeck (Michigan State University) have worked together to develop programs* offering growers strategies for A) downy mildew prevention, and B) management for downy mildew when the disease has been found at an operation:

A. PREVENTIVE PROGRAM

— Use when downy mildew has not been seen this year on your premises or in the landscape nearby, and your supplier has not experienced a disease outbreak.

1. First and last application:

SubdueMAXX (1.0 oz/100 gal) + Adorn (2.0 oz/100 gal) drench

Treat soon after plants received unless propagator has treated just before shipment.

2. Two weeks later:

A strobilurin (Compass O or Disarm O or Fenstop or Heritage or Insignia or Pageant) spray, using high label rate + mancozeb (e.g. Protect DF at 1-2 lb/100 gal) as a tank mix

3. Two weeks later:

Segway (2.1 fl oz/100 gal) spray

4. Two weeks later:

Stature SC (6.12 fl oz/100 gal) spray

5. Repeat # 2, 3, 4 at two-week intervals, as needed. Add mancozeb to any treatment if desired for Alternaria leaf spot control.

Last application, shortly before shipment: SubdueMAXX + Adorn drench, as in #1

B. MANAGEMENT PROGRAM

— Use when downy mildew has been found on impatiens on your premises or nearby, or your supplier has had a disease outbreak.

1. First and last application:

SubdueMAXX (1.0 oz/100 gal) + Adorn (2.0 oz/100 gal) drench

Treat soon after plants received unless propagator has treated just before shipment.

2. One week later:

A strobilurin (Compass O or Disarm O or Fenstop or Heritage or Insignia or Pageant) spray, using high label rate + mancozeb (e.g. Protect DF at 1-2 lb/100 gal) as a tank mix

3. One week later:

Segway (3.5 fl oz/100 gal) + mancozeb spray (as above)

4. One week later:

Stature SC (12.25 fl oz/100 gal) + mancozeb spray (as above)

5. Repeat # 2, 3, 4 at one-week intervals, as needed.

Last application, shortly before shipment: SubdueMAXX + Adorn drench as in #1

** Program developed by M. Hausbeck and M. Daughtrey based on experimental data of M. Hausbeck (cucurbit and coleus downy mildew); M. Daughtrey (coleus and impatiens downy mildew); and C. Warfield, Ball Horticultural Company (impatiens downy mildew). Follow*

all label instructions and note warnings; local restrictions may apply.

For more information and other suggested treatment programs:

Joining Forces (GrowerTalks, January 2012) – <http://www.ballpublishing.com/growertalks/ViewArticle.aspx?articleid=18917>

Impatiens Downy Mildew (Syngenta) – http://www.syngentaflowers.com/country/us/en/seeds/PDF%20and%20Other%20document%20Storage%20Library/GoldsmithSeeds_PDF/WhitePapers/Downy_Mildew_of_Impatiens_LA.pdf

Impatiens Downy Mildew: Guidelines for Growers (Ball Horticultural Company) – <http://www.ballhort.com/pdf/ImpatiensDownyMildewGrowerGuidelines.pdf>