GROWERTALKS

Pest Management

2/28/2017

Still Not Out of the Woods: IDM 2017

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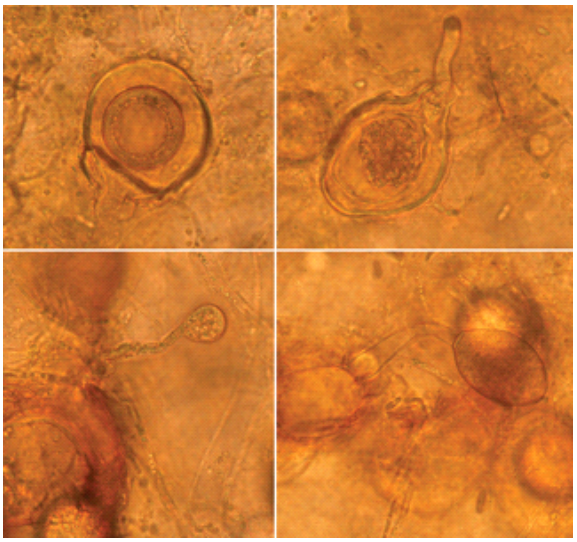
The downy mildew of impatiens (IDM) has been a game-changer for greenhouse growers. Once making up half of spring production for some, *Impatiens walleriana* has dwindled in recent years to half its former glory, economically speaking.

But the public still wants these affordable and colorful plants, and many in the U.S. and Canada have decided that they've waited long enough. After several years without the standard bedding plant impatiens, they think it should be safe to plant now. They expect that a disease that came out of nowhere should disappear just as magically.

Alas, this is not the case. The disease didn't come out of nowhere. The pathogen can be found on specimens of wild impatiens species collected in Massachusetts and Iowa in the late 1800s at the herbarium at the USDA ARS Herbarium in Beltsville, Maryland. This downy mildew existed long before we saw the problem in the greenhouse industry—long before *I. walleriana* was developed as a mainstay of landscape decoration.

Plant breeders may have accidentally chosen hyper-susceptibility to the disease as they developed impatiens with terrific flowering ability. Whereas many pathogens will mar a portion of the petals, leaves or stems when they act as parasites of their host plants, Plasmopara obducens (the cause of IDM) dispatches *I. walleriana* plants altogether. It invades the plants in a thoroughly systemic manner. Infected plants will stop flowering; show yellowed, wilty leaves; drop all of their foliage and keel over—in just a few weeks.



Pictured: Starting at upper left, a thick-walled oospore of the downy mildew Plasmopara obducens in impatiens stem debris. Top right, an oospore starting to germinate. Lower left, the beginning of sporangium formation. Lower right, a sporangium formed from an oospore, which will produce zoospores.

Our studies of the effect of P. obducens on different impatiens species have shown an important pattern. When grown under the same conditions in a replicated trial, most species of impatiens will develop a few leaf spots. A few will show some branch dieback, yet the *I. walleriana* plants beside them develop lawns of white sporangia across the undersurface of all of the leaves and proceed to collapse and melt away. The balsam impatiens, *I. balsamina*, is one contrast to *I. walleriana*—balsams show yellow or brown leaf spots, but plants continue to stand tall and continue to flower.

The other plants in the genus appear to be invaded much less extensively than *I. walleriana*. Although hosts for the disease, they're able to continue to grow and flower in spite of it, showing only scattered leaf spots.

In our trials at the Long Island Horticultural Research Laboratory of Cornell University, 13 other species have been demonstrated to be hosts, but have shown a much higher degree of resistance or tolerance to infection than *I. walleriana*. And 10 species or hybrids of the genus impatiens have shown no symptoms or sporulation in tests to date—even though shaded conditions with twice-a-day overhead irrigation were supplied and I. walleriana were dying in neighboring pots. The picture that these data paint suggests that the unusual thing is the high level of susceptibility in *I. walleriana*, rather than the aggressiveness of the pathogen.

Dr. JoAnne Crouch and others in her ARS research lab have studied populations of *P. obducens* and observed a number of different genetic strains causing the disease across the United States. The implication is that this problem didn't have a single source. And the pathogen populations are changing in response to environmental factors: the impatiens downy mildew in South Florida, for example, is quite resistant to mefenoxam, found in SubdueMAXX.

The super-susceptibility of *I. walleriana* is one reason why it would be a bad strategy to return to this crop in a big way. It's not going to be safe to plant impatiens until we have I. walleriana with a different genetic makeup from what's available now. At present the industry is making do with begonia, torenia, browallia, coleus—or with other species of impatiens (New Guinea impatiens, *I. hawkeri*) or hybrids, such as SunPatiens or Bounce, that don't contain *I. walleriana* in their genetic makeup and have superior resistance to downy mildew disease.

When impatiens are produced in frost-free areas of the U.S., sporangia of the downy mildew can, in rare instances, blow into the greenhouse from infected plants outside. Even growers in the northern U.S. are vulnerable to sporangia that might blow into the greenhouse during late spring in areas where *Impatiens balsamina* or *I. capensis* or *I. pallida* are growing nearby—or where infected *I. walleriana* has been shipped

into the area.

Another key reason that bedding plant impatiens aren't "safe" is the oospore. Oospores are microscopic structures that downy mildews produce in the interest of allowing them to survive the winter (when their herbaceous plant hosts cannot be relied upon). As with seed of some highly successful weeds, these overwintering structures can be counted upon to survive for more than one winter. The details of exactly how long are not known for impatiens downy mildew, but judging from the 10 year in-soil survival of oospores of the closely-related sunflower downy mildew, we can expect that flower beds contaminated by impatiens that died of downy mildew several years ago are still dangerous places to plant impatiens this spring.

Dr. Nina Shishkoff at USDA-ARS in Fort Detrick, Maryland, has been working with the oospores of the impatiens downy mildew. She was the first to observe how a cold treatment would allow a percentage of the thousands of oospores in impatiens stem debris to germinate once supplied with moisture. The oospores are brown and thick-walled to protect them from breakdown by UV light and other soil microorganisms. Once conditioned by temperature, moisture and perhaps other factors that we are not yet aware of, they will germinate to produce an extra-large sporangium. Under wet conditions in the laboratory, this sporangium will give rise to tiny swimming zoospores that are able to infect impatiens. In the garden, we expect that these zoospores might be splashed onto lower leaves during a heavy rainstorm or swim (short micro-distances) to impatiens roots to infect them directly.

Given the extraordinary susceptibility of *I. walleriana*, the possibility of infected plants overwintering in frost-free areas and the possibility of overwintering in the soil as oospores in temperate climates, we certainly haven't seen the end of this disease. Greenhouse outbreaks were seen early last year in Oklahoma, Florida, Georgia and Texas.

In the summer, landscape outbreaks were reported from Ohio, Maryland, Wisconsin, Delaware and Pennsylvania. Healthy impatiens that we placed in-ground where impatiens had died in 2015 developed downy mildew at the end of August, two months after transplanting—but only two weeks after trickle irrigation was supplemented with overhead irrigation. Oospores in flowerbeds will be able to start infections on healthy plants when weather permits.

In spite of the demand from the gardening public with high optimism or short memories, gardeners will be wise to use I. walleriana as an occasional embellishment in the garden, not as a monoculture. For large mass plantings, New Guinea impatiens and hybrids without I. walleriana parentage will be far smarter choices. Weather will vary from year to year and will sometimes favor downy mildew. A wet, rainy spring might easily lead to dramatic downy mildew outbreaks, such as we observed in 2011-2013. But problems will probably be more localized than in those early years now that the industry is well aware of how to identify the disease and control it with fungicides. **GT**

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