



Leaf curl is just one symptom of downy mildew on coleus. (Photos: Margery Daughtrey)

# New Disease Attacking Coleus

A new downy mildew that affects coleus is being reported in several North American locations for the first time.

**By Margery Daughtrey, Brian Eshenaur and Gordon Holcomb**

**A** new downy mildew that affects coleus has recently been discovered and is causing alarm for both coleus growers and researchers. The new coleus downy mildew disease is caused by a microorganism that may be new to North America. To our knowledge, downy mildew has not been recorded on coleus before.

The microscopic appearance of the coleus pathogen looks like *Peronospora lamii*, a familiar downy mildew that affects some members of the mint family, such as salvia. Tests of coleus downy mildew DNA, however, have indicated that it is a different species — one that has previously been seen in Europe on greenhouse-grown basil in Italy and Switzerland. For now, the coleus pathogen can be referred to as *Peronospora sp.* We know that it can infect both coleus and basil, but the possibility it can go to additional plant hosts certainly exists.

## Familiar Downy Mildews

You may already be familiar with downy mildew of rose or snapdragon. If you have been growing spring greenhouse crops in the past few years, you may even have encountered downy mildew on argyranthemum or impatiens.

Each of these diseases is caused by a different downy mildew pathogen — the diseases are similar, but the pathogens have particular host ranges and cannot be exchanged among roses, impatiens, snapdragons and argyranthemums.

Downy mildews are not fungi; instead they are relatives of Pythium and Phytophthora and are more closely related to algae. They are favored by very moist, humid environments, such as those prevalent during plant propagation in the spring.

## Symptoms On Coleus

The symptoms on coleus include irregular, brown leaf spots or flecking, leaf twist and leaf drop. The leaf spotting can take the form of squarish patches bounded by larger veins. This downy mildew produces branched conidiophores that protrude through the stomata on the undersurfaces of leaves; ovoid conidia (spores) are produced on the pointed tips of the branches. At first, the spores are transparent and then turn grayish-brown as they mature, making the leaf undersurface appear somewhat “dirty” to the naked eye. The sporulation can be sparse, but sometimes a thick, downy coating develops even on leaves that look perfectly normal. The sporulation often is found on healthy-looking parts of leaves that show some dead patches.

Downy mildew spores can spread the disease in different ways. It can be spread when infected plants are moved or it gets on workers’ hands or clothing. It also can be splashed or blown from one plant to another.

Symptoms also develop on coleus in landscape plantings, at least in more Northerly locations. In 2005, coleus with downy mildew, found in gardens in Western New York, showed leaf stunting, flecking and spotting as well as leaf drop. These symptoms were especially noticeable on lime-green cultivars.

## Keeping Track And Control

We observed this new disease for the first time in spring 2005. It was seen in both New York and Louisiana in production and retail locations. This year, growers in New York and Louisiana have reported the disease once again, and it has been detected in several additional states as well. Often, symptoms of downy mildew on coleus are difficult to see, particularly when leaves are colorfully pat-

terned. Some growers have blamed themselves for “keeping the plants too wet” when in reality this contagious disease is at fault for poor coleus health.

Keeping track of the disease will be very challenging since it can be present in leaves that show no symptoms and thus will be inadvertently shipped from one greenhouse to another. The impact on a greenhouse coleus crop will vary according to environmental conditions and the particular cultivars being grown. Leaves infected



**Top:** Coleus in the landscape infected with downy mildew may have a very thin, sparse canopy due to leaf drop. **Bottom:** Spotting on leaves is one common symptom of downy mildew.



during moist propagation conditions may develop ugly, brown spotting or twisting or fall from the plant after they are moved to drier environments.

The exchange of coleus cuttings certainly will spread the disease, but seed-grown types are also susceptible. Growing cutting- and seed-propagated coleus together in the same greenhouse is no longer prudent, as the cuttings can serve as a source of inoculum for the seedlings.

### Protecting Crops

To protect against downy mildew losses, growers should scout for symptoms in their coleus crops each spring. Any flecking or spotting, no matter how slight, should be a signal to look underneath the leaves for the telltale sporulation. Obviously, diseased plants should be discarded.

Once the disease has appeared on the premises in a given year, growers should use appropriate fungicides for the rest of the production season to protect the remainder of the crop from the disease. Alternating systemic and protectant materials will give an effective program that will guard against the development of pesticide resistance in this downy mildew.

Systemic or partly systemic materials effective against other downy mildews include StatureDM (dimethomorph, SePRO Corporation), Chipco Aliette (fosetyl-al, Bayer Environmental Science) Alude (phosphorus acid, Cleary Chemical Corporation), Compass (trifloxystrobin, OHP) and Heritage (azoxystrobin, Syngenta Professional Products). Note that Aliette and Alude are both phosphorous acid

materials and Compass and Heritage are both strobilurins, so within each pair there is one mode of action and rotations between the two would encourage resistance and defeat the purpose of rotating.

For protectant action against downy mildews, mancozebs (e.g.,

Protect T/O, Cleary Chemical Company) are especially effective, and coppers are also helpful. Keeping stock plants after an outbreak of downy mildew will be a very risky proposition, as there is no guarantee that fungicide applications can eradicate the downy mildew

from infected coleus. If possible, keep stock from different suppliers separate so a problem with one shipment will not lead to contamination of all the coleus on the premises.

Keeping seed-grown coleus separate from cutting-grown coleus will be especially desirable. ♦



Grayish, speckled patches may appear on downy mildew-infected coleus leaves under humid conditions.

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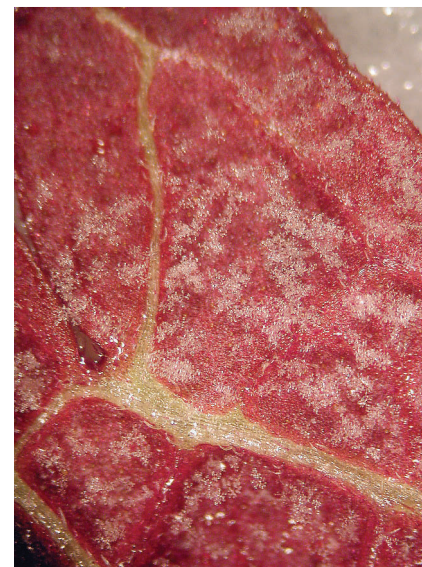
Although some downy mildew diseases have been known to be spread by seed, there is no evidence of this phenomenon happening with coleus seed. If diseased coleus or basil plants are pulled from containers, these can be replanted with any other species safely — with the

possible exception of other members of the mint family, such as salvia, rosemary and lamium.

### The Future

Research on this new disease is now underway. Ultimately, improved awareness of the problem

in the industry will reduce the chance the disease will be exchanged among growers. Domestic stock that is already infected will perpetuate the disease in the United States unless the problem is identified and solved in every production facility.



The sporulation of downy mildew will appear light-colored at first and then darken as the spores mature. Here the downy mildew sporulation entirely covers the underside of the leaf.



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ty. The importation of unrooted coleus cuttings from other countries is another possible avenue for introducing downy mildew, so offshore production sites also need to establish downy mildew management programs.

If downy mildew proves to be extremely challenging for some coleus cultivars, they will gradually be discarded in favor of cultivars that have a natural resistance to this disease. Thus far, investigations indicate that many different cultivars of coleus are susceptible, but the symptom severity varies widely. It will be important to develop reliable methods of management for coleus downy mildew, as this crop has become a mainstay in the mixed container trade. **GPN**

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