

## Downy Mildew of Basil in South Florida<sup>1</sup>

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### Introduction

Downy mildew of basil, caused by *Peronospora belbahrii*, is a new destructive disease that has spread widely and is expected to occur routinely in the US now that the pathogen has been introduced. Infection results in yellowing and cupping of the leaves. The unsightly sporulation of the abaxial leaf surface makes the product unacceptable for the marketplace. Downy mildew was first detected on basil in south Florida in 2007, and subsequently in many US states including North Carolina, Pennsylvania, New Jersey, New York, Massachusetts, Kansas, and Missouri in 2008, and California, Delaware, Illinois, and Virginia in 2009. Downy mildew has been also reported in many other countries such as Switzerland, Italy, France, Belgium, Israel, New Zealand, and South Africa during 2001-2005, and recently Cameroon, Canada and in greenhouse-grown basil in Argentina. Prior to these recent outbreaks, downy mildew had only been reported on basil in Uganda in 1933.

Recently, downy mildew was also observed on ornamental plants related to basil, particularly coleus (*Solenostemon* spp.) and salvia (*Salvia* spp.) which belong to the Lamiaceae family including basil (*Ocimum* spp.), mints (*Menta* spp.), sages (*Salvia*

spp.) and other aromatics. The pathogens of downy mildew on coleus and basil were demonstrated to be genetically different. However, there are many basil-related ornamentals that are also hosts to the downy mildew pathogen affecting basil grown for use as an herb. Although spores of the basil downy mildew pathogen are capable of being dispersed long distance, it is believed that contaminated seed is most likely the way that the basil downy mildew pathogen has been able to move between geographically-separated areas. The pathogen found in Florida has been shown to be genetically the same as that in Switzerland.

### Symptoms

The pathogen of downy mildew that infects plants related to basil, such as the ornamental plants coleus and salvia, is present in Florida. However, it is not known whether this is the same downy mildew pathogen and which particular hosts are infected by this strain although the isolate from coleus is reported to infect basil in greenhouses in New York.

Symptoms of downy mildew initially appear as yellowing of basil leaves (Fig. 1) and are typically concentrated around the middle vein (Fig. 2).

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Growers generally do not realize their basil plants are infected with downy mildew disease since the most noticeable symptom on affected basil is yellowing of the leaves (Fig. 1), which is phenotypically similar as the result of a nutritional problem. The discolored area may cover most of the leaf surface. On the underside of leaves, a gray, fuzzy growth may be apparent by visual inspection (Fig. 3). Under high humidity, the chlorotic areas on the leaf turn to dark brown quickly (Fig. 4). Sporangia, the reproductive structures of the pathogen, are easily detected under magnification and are diagnostic for this disease (Fig.5).



**Figure 1.** Symptoms of downy mildew on basil.



**Figure 2.** Top of basil leaf exhibiting symptoms of downy mildew.

## Control

Few fungicides are currently labeled for control of downy mildew on basil. Some phosphorous acid fungicides are effective against downy mildew under herbs on the current label. These fungicides were effective in fungicide efficacy experiments with applications started before or after initial symptoms were found. Actinovate AG is an OMRI-listed



**Figure 3.** Sporulation evident on underside of the basil leaf.



**Figure 4.** Symptoms of downy mildew on basil leaves under high humidity.



**Figure 5.** Sporangiphore and attached sporangia of basil downy mildew pathogen.

fungicide that is labeled for use on herbs and for suppressing foliar diseases including downy mildew. Other fungicides are expected to be labeled for this use in the future.

Although few fungicides are specifically labeled for this disease, some fungicides which are labeled on basil may be useful in disease management. Reducing the period of leaf wetness by avoiding overhead

watering may also be helpful. Heavily infected plants should be discarded. If possible, isolate new plantings to reduce inoculum spread from older plantings. The pathogen is believed to be seed transmitted. Consult the University of Florida, IFAS Plant disease Management Guide and current labels for specific and current fungicide recommendations.