

Downy Mildew in plants

Mark Huey, Horticulture Adviser, CAFRE

Although prevalent at the same time as powdery mildew (spring and autumn), and it sounds like they should be related, the signs, symptoms and causative agents of downy mildew are different. Downy mildews, which affect edible and ornamental plants, belong to a group of fungus-like organisms termed Oomycetes (which are more closely related to algae than fungi). This pathogen group includes some of the most aggressive and damaging plant pathogens known to man such as *Phytophthora destructor* (potato blight).



Downy Mildew Impatiens

Plasmopara, *Peronospora*, *Bremia*, *Pseudoperonospora*, and *Basidiophora* are the main genera that cause downy mildews. Although most species are highly host specific, with species such as *Peronospora sparsae* only affecting roses, some will affect a wider range of hosts like *Peronospora lamii* which can attack basil, salvia and dead nettles. Given the wider host range, the symptoms expressed in affected plants vary widely, with some symptoms easily confused with bacterial infections or foliar nematodes. However, in general initial symptoms are paler, light green irregularly shaped spots/patches that appear on the upper surface of older leaves, and during sporulation grey/blue fuzzy patches (the sporangia, which under high resolution look like bunches of grapes) develop on the underside of the leaf. These patches can vary in colour according to type of downy mildew/infected plant and can be white, brown grey or black.



Unlike powdery mildew, downy mildew infections are systemic with sporulation only occurring when environmental conditions are suitable. Active infections can therefore be easily missed, and by the time the fluffy patches appear under the leaf, control is very hard to achieve. Since it can take as little as six days from initial infection to sporulation on a leaf, downy mildew infections can rapidly get out of control and cause real crop damage.

Since control of an active infection is practically impossible, emphasis must be on prevention. Scouting the crop should take place at least once a week, but preferably every 2-3 days in high risk periods, looking for symptoms on upper surfaces and turning over leaves to inspect for sporulation, with particular attention paid to susceptible crops (e.g. pansy).

Depending in the genus, downy mildew can persist in the environment through resting spores in the soil, or on weeds that act as a 'green bridge' allowing the pathogen to persist in the local environment. Growers should therefore minimise weed growth inside and outside the greenhouse/polytunnel and any ornamental beds close to the greenhouse should not be planted with highly susceptible plants such as snapdragon, *Primula* and pansy. If any diseased plants are detected in the production area these should be immediately removed along with asymptomatic plants in the immediate vicinity.



Optimum temperature for downy mildews varies between species, but are generally in the range of 10°C to 25°C, similar to botrytis. Low light conditions also encourage the disease. More than six hours of leaf wetness can cause a sudden explosion in the rate of downy mildew infections, but keeping relative humidity at less than 85-90% will restrict ability of spores to germinate on leaf surfaces and reduce

sporulation. Use of proper spacing, generating good airflow in the crop canopy using fans and only watering in the morning can all help.

Without implementing good cultural controls, a fungicide spray program will be relatively ineffective. The highest levels of control are obtained when fungicides are applied preventively. Downy mildews belong to a different phylum to powdery mildews and require different fungicides. As with powdery mildews a number of fungicide resistant downy mildew strains have developed, so to minimise risk of fungicide resistance developing growers should rotate fungicide application between different FRAC groups, if possible selecting from at least 3 different groups. If some of fungicides that can be applied to a crop possess some systemic/eradicator activity, these should also be applied at first sign of disease, then followed up with a protectant spray programme.



Downy Mildew on Basil



Lisianthus Downy Mildew