

# Downy Mildew Diseases

## Understanding the pathogens

**Downy Mildew diseases** are caused by a group of algae-like organisms known as oomycetes (a.k.a. water molds) including species of *Plasmopara*, *Peronospora*, *Pseudoperonospora*, *Sclerospora*, and *Bremia*. The oomycetes, which also include *Pythium* and *Phytophthora*, are among the most destructive plant pathogens worldwide. Each species of the parasite attacks one or a few species of host/plant, and thrives under a particular set of environmental conditions. Oomycetes have extraordinary abilities to self-propagate, distribute, and survive under extreme conditions. The biology and diversity of these pathogens makes the management of downy mildew diseases particularly challenging for many growers. It is important to understand that not all downy mildew diseases are the same or can be managed using the same programs. **Consult your local OHP Regional Sales Manager at (800) 356-4647 for additional suggestions for preventing Downy Mildew on your crop.**



Downy Mildew on rose



Downy Mildew sporulation on basil  
Dr. Ann Chase



Downy Mildew sporulation on underside of  
coleus leaf

## Conditions Favorable for Downy Mildew Diseases

**Downy Mildew diseases** can develop under cool to warm (not hot) temperatures, with wet conditions and high humidity. Six continuous hours of leaf wetness after an irrigation or rain event is enough for the pathogens to establish an internal infection within the host plant. However, disease symptoms may not appear until weather conditions are right for the pathogen to complete development. Spores are typically produced under high relative humidity and released under low relative humidity. When conditions are

right microscopic sporangia (spore sacs) develop on the bottom of the leaf and may become visible giving a 'fuzzy-down' appearance to the leaf underside. Yellow patches or discolored blotches may appear on the exact opposite side, on the upper leaf surface. Common symptoms are not always easy to distinguish and may be similar to those caused by other plant stress factors. On a few plants, symptoms include shoot distortion, stunting and curling of new leaves, similar to those caused by pests such as aphid feeding injury.

Management of plant diseases like downy mildew starts with good crop management practices to reduce the risk of disease epidemics. Sanitation of growing areas, equipment and tools is critical as these pathogens can survive for long periods of time until the right host plant and environmental conditions arise. To reduce the risks of infection it is important to irrigate early in the day and to promote good air circulation (plant spacing) to avoid long leaf-wetness periods, especially overnight. Over-fertilization with nitrogen may increase plant susceptibility to the disease and should be avoided. Frequently monitor the crop to quickly detect signs and symptoms of pests and diseases. Quickly remove and destroy any plant that is suspected of

carrying the disease or treat as necessary. Even the best cultural practices are often not enough to prevent infections when the environmental conditions favor disease development.

Chemical control is challenging and most fungicides only offer protection from the disease but not eradication once it is established in the plant. When conditions remain favorable for downy mildew diseases it is important to use fungicides in a rotation program based on their mode of action, to reduce the risk of fungicide resistance development and disease control failure. Under disease- favorable conditions, fungicide applications are made on 7-day intervals, using one or two fungicides at a time, for the duration of the high risk period.

## OHP Products Registered for Control of Downy Mildews

OHP Products	Chemical Class	MOA Group	Residual	REI (hours)	OMRI
<b>Areca®</b>	Ethyl Phosphonates	P 07	7 to 14 days	12	
<b>Kalmor™</b>	Inorganic, Copper Hydroxide	M 01	7 to 14 days	24 to 48	✓
<b>Segway® O</b>	Cyano-imidazole	21	7 to 14 days	12	
<b>Triathlon® BA</b>	Biological	44	7 days	4	✓

## OHP Recipe for Success on Controlling Downy Mildews – Traditional Production

Products	Rate per 100 gallons	Rate per gallon	Residual
1.) <b>Segway® O</b>	3.5 fl. oz.	½ tsp or 1.77 mL	7 to 14 days
2.) <b>Areca®</b>	1 to 2 pounds or 28 to 57 grams	2.5 tsp or 12 grams	7 to 14 days
3.) <b>Stature®</b>	12 ounces	1.2 oz or 4 tsp	7 to 14 days

## OHP Recipe for Success on Controlling Downy Mildews – Veg/Herbs or Organic Production

Products	Rate per 100 gallons	Rate per gallon	Residual	OMRI
1.) <b>Triathlon® BA</b>	4 quarts	10 tsp or 50 mL	3 to 5 days	✓
2.) <b>Kalmor™</b>	1 pound	1 TBS or 0.45 pounds	7 days	✓

**Note:** Triathlon BA is registered for vegetables and herbs and most ornamentals.

TBS = tablespoon    tsp = teaspoon    mL = milliliter    1 fl oz = 29.6 mL    1 tsp = 5 mL

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Segway O is a registered trademark of Ishihara Sangyo Kaisha, Ltd.  
Stature is a registered trademark of BASF.