Apply fungicides preventively
Fungicides may be applied every 7 to 10 days in a preventive program. At the first disease symptom, the interval between fungicide sprays should be shortened to five days.

Drench at transplanting:
• Heritage®: 0.45 to 0.9 oz/100 gal
• Subdue MAXX® rate for bedding plants (seeding): 0.13–0.25 ft² oz/100 gal at 1–2 month application interval
• Subdue MAXX® rate for transplants (full-sized): 0.5–1.0 fl oz/100 gal at 1–2 month application interval
(When Subdue MAXX is used as a drench for prevention of root rot, downy mildew will also be controlled.)

Protectant rotation program:

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage + Protect™ T/O or DF (or Dithane® 75 DF)</td>
<td>Heritage rate: 1–2 oz (bedding plants) every 7–14 days prior to infection</td>
</tr>
<tr>
<td></td>
<td>Heritage rate: 2–4 oz every 14–21 days (for roses)</td>
</tr>
<tr>
<td>Protect T/O or DF (or Dithane 75DF)</td>
<td>Protect (same rate above)</td>
</tr>
<tr>
<td>Stature® + Protect T/O or DF (or Dithane 75DF)</td>
<td>Stature rate: 6.4–12.8 oz foliar spray at 10–14 day intervals</td>
</tr>
<tr>
<td>Protect T/O or DF (or Dithane 75DF)</td>
<td>Protect (same rate above)</td>
</tr>
<tr>
<td>Aliette®</td>
<td>Aliette rate: 1.25–4.0 lbs (bedding plants) 2.50 lbs (roses)</td>
</tr>
</tbody>
</table>

Rates are given as amount of product per 100 gal. Please review all product labels for instructions before making an application to your crop.
Identifying and treating downy mildew

**Disease symptoms**
Yellowish, tan, or reddish blotchy areas/spots on the topside of the leaves are early disease indicators. A velvety-fuzzy mat develops on the underside of the leaves and is best seen in the morning or when conditions are humid and moist. Using a 10X hand lens is helpful. The color of this mat can range from white to gray/purple, depending on the crop. This fuzzy mat is made up of numerous specialized spores called “sporangia” and is unique to the downy mildews.

**Checklist**
- Yellowish or pale green foliage.
- Downward curling of the leaves.
- Distorted leaves.
- White to light gray/purple fuzz on the undersides of leaves.
- Emerging leaves are small.
- Flower buds fail to form.
- Plants are stunted.

**Crop damage**
Leaf spotting is a common symptom and is called a “local infection” because only that leaf is diseased. Severe plant stunting, distortion, and death occur when the downy mildew fungus invades the internal system of the plant causing a “systemic infection” that affects the entire plant. Systemic infection can occur when seedlings or young plants become infected through developing roots. This can happen when the downy mildew fungus is on the seed or has contaminated the soil/growing medium.

**Susceptible crops**
Some plants are especially susceptible to downy mildew fungi. However, the disease can look different on various crops.

**Alyssum**: Early symptoms include yellow leaves. Distorted growth is common. A downy-like mat occurs underneath the leaves.

**Buddleia**: Angular leaf spots

**Coles**: Angular leaf spots, general necrosis and blighting on leaves, leaf drop, fungal growth may or may not be seen on the underside of the leaf.

**Impatiens**: Light mottling, pale green foliage resembles a mild nutrient deficiency. The undersides of the leaves are covered with a white loose powder that is easily released, resulting in “snow” in the greenhouse during overhead watering.

**Pansy**: Yellow foliage with purple blotches on the upper leaf surface. A gray/purple growth develops on the undersides of the leaves.

**Rose (miniature, greenhouse, and field-grown)**: Dark (purple to black), angular leaf spots, general leaf browning, stem cankers, and rapid leaf drop. The fuzzy mat on the underside of the leaf may be sparse and difficult to see without a hand lens.

**Salvia**: Yellow blotches are angular and occur between major leaf veins. A grayish, purple fuzz develops on the underside of the leaves.

**Snapdragon (bedding and cut flowers)**: Plant stunting, downward curling of the leaves, short internodes, and small leaves. Infected seedlings die. Less severe symptoms include light-green to yellow blotches on leaves. As the infection progresses, these leaves change to a reddish-purple color. Whitegray sporae form on the underside of infected leaves. “Potomac Rose,” “Potomac Apple,” and “Potomac Dark Orange” are less susceptible than “Rocket White” and “Potomac Early Pink.”

**Environment favoring disease**
Temperatures from 50° F to 72° F are favored by most downy mildew fungi. Higher temperatures are tolerated by the downy mildew fungi that infect rose (up to 82° F) and salvia (up to 90° F). All downy mildew fungi require high relative humidity (greater than 85%) and extended periods (six hours or more) when the leaves are wet. Only a thin layer of moisture on the foliage is needed for disease to develop.

**Cultural tips**
A dry, clean growing environment coupled with preventive fungicide treatments can protect susceptible crops.

**Look for the disease**. Downy mildew is explosive so early detection is a must. Susceptible crops should be scouted weekly, turning leaves over to look for the distinctive mat of spores. Shipments of plants prone to downy mildew should be inspected for disease prior to placing them in the growing area.

**Keep the production area clean**. A thick-walled survival spore (oospore) persists in compost or cull piles where volunteer plants are likely. Once these volunteer plants become infected, masses of spores are produced and more plants become infected.

**Spores are produced on diseased plants and spread on air currents**. Remove diseased plants/plant parts immediately to limit spore production and spread. Place infected plants into closed containers/bags so spores cannot spread to nearby healthy plants.

**Keep the growing environment dry**. Vent, reduce the time that leaves are wet, and keep relative humidity to a minimum. Water plants at a time of day that allows foliage to dry quickly. Consider using drip or subsurface irrigation on key crops prone to this disease.