

## 2006 Florida Plant Disease Management Guide: Lettuce and Endive<sup>1</sup>

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### Specific Common Diseases

#### **Alternaria Leaf Spot (*Alternaria sonchi*, *Alternaria* spp.)**

**Symptoms:** Small circular spots are formed, the centers of which gradually dry and turn black. Production of spores increases the black appearance of the spots. Leaf lesions often exhibit a zonate appearance.

**Chemical Controls:** Rarely an economic problem in Florida, the use of maneb fungicides to control downy mildew on lettuce or endive will aid in control of this disease.

#### **Bacterial Blight (*Pseudomonas marginalis* *pv. marginalis*)**

**Symptoms:** This disease begins on older, outer leaves. First, water soaking begins usually towards the leaf base. Then brown-to-red or black decay appears and later infected areas become slimy and foul smelling. During shipment, a pink rib symptom may appear.

**Cultural Controls:** Avoid mechanical injuries during harvesting. The use of rapid pre-cooling and the avoidance of crushing and free water in shipping containers will aid in the reduction in postharvest loss.

#### **Bacterial Leaf Spot (*Xanthomonas* *campestris* *pv. vitians*)**

**Symptoms:** This has been one of the most widespread and serious diseases of lettuce to appear in Florida in recent years. Lesions begin as small water-soaked spots on outer leaves. As the lesions mature, they become brown to black and greasy-looking. Even mature lesions may remain water-soaked on the underside of leaves. In some cases, especially on romaine-type lettuces, a "peppery" look will develop among lesions. So far the disease has not been observed on endive.

**Cultural Controls:** Use only disease-free seed. Avoid movement in fields where plants are wet. Some differences in susceptibility exist among cultivars. Romaine-type lettuces generally are most

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susceptible and butterheads are least susceptible. Growers should not follow lettuce with lettuce in the same season, especially if the first crop has had a confirmed outbreak of bacterial leaf spot.

**Chemical Controls:** Treat seed with bleach or other disinfectant before pelletization. Copper sprays in the field applied for other diseases may provide some control of bacterial leaf spot, especially since most strains recovered to date are fairly sensitive to copper.

### **Botrytis Blight (*Botrytis cinerea*)**

**Symptoms:** The fungus can invade in the seedling stage through maturity as well as cause a post-harvest decay. Young plants or seedlings may damp-off as a result of *Botrytis* infection. Invasion normally begins on lower leaf margins and progresses throughout the head until it is a rotted slimy mess. The fungus produces a light-brown to ashen-gray layer of sporulation on diseased tissue. Spores are easily blown by wind, air movement, agitation or water splash. The disease may occur over a wide range of temperatures but is strongly favored by fog, light rain or high humidity periods, and moderate temperatures.

**Cultural Controls:** Prevent condensation and late-day waterings in greenhouse production sites. Sanitize infected tissue carefully and destroy. Prevent tissue damage in the field caused by other diseases, pesticide, or soluble salts burn.

**Chemical Controls:** See PPP-6.

### **Corky Root Rot (*Rhizomonas suberifaciens*)**

**Symptoms:** This bacterial disease is characterized by corkiness on the outer portions of the taproot, necrosis of the tip of the taproot, and reduced fibrous root mass. Vascular tissue of the taproot may be discolored and, in advanced cases, the taproot may disintegrate internally and become hollow. In the field, infected plants range from exhibiting little evidence of any disease to wilting, stunting, and death, depending on the degree of root damage.

**Cultural Controls:** Differences in cultivar susceptibility to corky root rot exists. Avoid planting in fields with a history of corky root rot.

### **Damping-off (*Pythium* spp., *Rhizoctonia solani*)**

**Symptoms:** Seed fails to germinate due to rapid colonization of seed by soilborne fungi. Excavated seed will be rotted and soft, often with evidence of fungal mycelium. Young, newly emerged seedlings often collapse at soil line and topple over. The stems may exhibit an obvious discoloration ranging in color from a reddish-brown to black and may be dry or mushy to the touch depending on the soil fungus involved.

**Cultural Controls:** Avoid planting seed when soil moisture, soil preparation, temperature or planting depth do not favor rapid emergence.

**Chemical Controls:** See PPP-6.

### **Downy Mildew (*Bremia lactucae*)**

**Symptoms:** Older leaves are the main ones infected by this fungus, but it may appear on any above-ground parts. It produces a yellow area on the upper surface of leaves, and usually a white or grayish fluffy growth on the underside of the same leaf areas. Lesions often coalesce into large areas. The causal fungus may survive on a number of native weeds including: chicory, cudweed, sowthistle, and wild lettuce. It may also arrive from other states on shipments of lettuce.

**Cultural Controls:** Infection will necessitate leaf trimming or stripping at harvest.

**Chemical Controls:** See PPP-6.

### **Drop (*Sclerotinia sclerotiorum*)**

**Symptoms:** The first symptom is a progressive wilt of older and then younger leaves; outer leaves collapse around plants in a fan pattern. The inner leaves become soft, dry rapidly, and turn dark in color. The fungus usually produces a heavy mycelial growth around the main stem and in cavities in the plant. As the plant dies, numerous black, irregular bodies (sclerotia) develop on and in the diseased

tissue. Sclerotia range in size from 1/4-3/4 inch in length. These survival structures of the causal fungus will fall to the soil surface where they persist for a number of years.

**Cultural Controls:** Since the disease is not serious every year, it is difficult to suggest a definite control program. Each of the following control measures has reduced drop, but when conditions become favorable for the development of the disease, it may be necessary to combine all of them in order to obtain satisfactory control.

1. Rotate with a crop not susceptible to this disease, such as sweet corn.
2. Turn soil at least 6 inches deep when plowing.
3. Flood the soil either completely, partially or intermittently for a period of six weeks during the summer. Before flooding, find out from local authorities if drainage into a given body of water is permissible.
4. Apply a fungicide for severe disease situations.

**Chemical Controls:** See PPP-6.

### **Erwinia Soft Rot (*Erwinia carotovora* pv. *carotovora*)**

**Symptoms:** This is a typical soft rot disease characterized by a wet, slimy decay with extensive brownish discoloration. Affected plants decompose rapidly in a loose, wet mass in the field. Although this soft rot is correlated with mechanical injuries on many crops, it can affect internal leaves within a head of lettuce and not be apparent from the external surface.

**Cultural Controls:** Avoid harvesting from field areas affected by this disease. Handling infected heads can result in spread of the soft rot bacterium by workers, harvesting equipment etc.

### **Mosaic [*Bidens mottle virus* (BMV), *Lettuce mosaic virus* (LMV)]**

**Symptoms:** Field differentiation of BMV from LMV cannot be reliably done without laboratory verification. Typical symptoms of BMV on lettuce include vein clearing, some mottling, and veinal

necrosis, as well as an increase in leaf serration. Young infected plants may exhibit severe stunting. Symptoms on endive are a more subtle leaf mottling with or without plant stunting. Escarole demonstrates a more pronounced leaf mottling due to the greater leaf surface.

Symptoms of LMV are similar on these leafy crops. Infected crisphead lettuce types may exhibit vein clearing, mosaic and stunting. Wrapper leaves are duller in appearance, typically fold backward and exhibit more leaf margin serration. Romaine types exhibit similar symptoms to crisphead types plus a characteristic leaf blistering. Affected butterhead types often are stunted and quite chlorotic. Endive and escarole plants affected with LMV exhibit chlorotic dots against the green leaf background.

Both viruses are vectored by aphids-especially the green peach aphid (*Myzus persicae*). LMV is known to be seedborne in most lettuce varieties but not escarole or endive. BMV is not known to be seedborne. Survival of BMV in Florida is strongly dependent on weed hosts, such as hairy beggar ticks (*Bidens pilosa*), Virginia pepperweed (*Lepidium virginicum*), horse weed (*Erigeron canadensis*), butterweed (*Senecio glabellus*), American burnweed (*Erechtites hieracifolia*) and Mexican prickly poppy (*Argemone mexicana*).

**Cultural Controls:** Strong weed control efforts directed toward old crop land and ditch banks will reduce surviving virus inoculum. Weed control is especially important to minimize BMV. State regulations for a 0 tolerance of LMV infected lettuce seed in a 30,000 seed test lot reduces LMV incidence in Florida. Avoid planting lettuce, endive or escarole crops near old plantings or crops such as carrots, Chinese cabbage, or radish that are favored feeding sites for aphids.

### **Rhizoctonia Bottom Rot (*Rhizoctonia solani*)**

**Symptoms:** Disease first occurs as soon as outer or lower leaves touch the soil surface, trapping moisture. Leaf petioles and midribs become rust colored and slightly sunken prior to leaf decay. Infection may spread upward through the head or leaf canopy destroying the entire plant. Obvious brown strands of the causal fungus can be observed on

severely affected heads. Sclerotia (dormant survival structures) of *Rhizoctonia* often form on the lower leaf tissue close to the soil.

**Cultural Controls:** Severely infested fields should be plowed deeply and allowed to fallow until all crop debris has rotted.

**Chemical Controls:** See PPP-6.

### **Tipburn**

**Symptoms:** This is a physiological (abiotic) problem. Disease incidence increases as plants approach marketable stage. Symptoms first appear as small, translucent spots near the margin of inner leaves. These spots discolor and the margins die. Injury can occur with no external signs unless soft-rotting organisms invade the tipburn areas causing a soft rot. Tipburn severity is greatest on butterhead and Romaine (cos) types. Environmental conditions that favor disease seem to be those where the greatest difference exists between soil temperatures and air temperature. This occurs when a dry, sunny period follows cool, moist weather.

**Cultural Controls:** Choose tipburn resistant or tolerant varieties where this disease has been a problem.