Martin-Gatton College of Agriculture, Food and Environment
Cooperative Extension Service

Pathology Fast Facts

Common Lettuce Diseases in Kentucky

Nicole Gauthier, Extension Plant Pathologist

Kim Leonberger, Plant Pathology Extension Associate

Lettuce and greens are grown as spring and fall crops in Kentucky. They are susceptible to several diseases of which lettuce drop and Pythium root rot are the most common and devastating. Lettuce diseases can develop in commercial fields, high tunnels, greenhouses, hydroponic systems, and residential gardens. The most common diseases are included here, but growers may encounter additional diseases not included in this publication. Contact a county Extension agent for assistance with disease confirmation.

Bacterial soft rot (*Pectobacterium carotovorum [formerly Erwinia carotovora],* other secondary bacteria*)* is caused by secondary infections of vascular tissue that often lead to slimy decay. Field infections begin as wilting with pinkish brown discoloration of lower leaves. As infections spread, leaf and crown tissue becomes water-soaked and slimy (known as "jelly butt"). Plants eventually collapse. Vascular discoloration can be observed in cut stems. Lettuce is most susceptible as it matures. Bacterial soft rot is most common as a postharvest disease, developing in storage or transit either from in-field infections or initiating from wounds made during harvest and handling. *Pectobacterium* sp. favors wet conditions and warm temperatures (above 77°F). Management should focus on prevention. Maintain appropriate moisture levels and adequate drainage. Remove dead, dying, and diseased plants as soon as they appear. Clean harvest tools regularly. Avoid wounding or bruising leaves during harvest. Bactericides such as copper can help suppress disease or prevent new infections.

Black root rot (*Berkeleyomyces rouxiae* [formerly *Thielaviopsis basicola*]) is a soilborne, fungal disease that infects roots, often at the seedling stage. Affected plants remain stunted throughout the growing season but otherwise appear healthy. Infected roots begin with brown to black lesions that can coalesce to cause root rot. *Berkeleyomyces* sp. has a wide host range that includes field crops and ornamentals, but it is also found in production greenhouses. The fungus can survive extended periods of drought but favors wet soils and cool temperatures (55 to 65°F). Shore flies are known to transmit the fungus. Management should begin with good sanitation. Avoid movement of contaminated soil and media. Fallow and sanitize greenhouses between crops. Rotate out of fields with known infestation. Solarization of high tunnels can reduce populations. Fungicides can help suppress disease in production fields. Fungicides can be used as preventatives in greenhouses with a history of black root rot.

Botrytis gray mold (*Botrytis cinerea*) is a fungal disease that begins as a soft rot of lower leaves. Symptoms appear brownish-gray to orange, particularly on leaves that touch the soil or media. Infection occurs as leaves age or become damaged. Fuzzy, gray fungal growth is often visible as disease becomes severe. Infection can spread to surrounding, healthy leaves and crown. *Botrytis* sp. is prevalent in most environments, but disease proliferates when humidity reaches 85% and senescent tissue or debris is readily available. Gray mold usually occurs under cool conditions (65 to 75°F) such as in shaded areas, within dense canopies, or during spring or fall when nighttime temperatures are low. Disease is most likely to occur in greenhouses and high tunnels (including hydroponic production systems) where air flow is limited and humidity is high. Management should begin with a good sanitation program that prioritizes removal of dead, dying, and diseased leaves as soon as they appear. Maintain humidity below 85% by exchanging indoor air and avoiding overhead irrigation. Use mulch to prevent direct contact with wet surfaces. Preventative fungicides are effective when conditions are conducive for disease.

Bottom rot (*Rhizoctonia solani*) is a soilborne, fungal disease that causes rot on lower leaves in direct contact with soil. Initial symptoms include brown to orange lesions on lower leaves, expanding to midribs. If disease becomes severe, rot expands to inner leaves and heads. The crown is often the last part of the plant to decay. *Rhizoctonia* sp. is often present in all field soils and can be present in contaminated media. Bottom rot occurs under warm (77 to 95°F), wet conditions and usually affects fall lettuce crops soon after planting. The fungus can infect healthy leaves or colonize dead or dying tissue. Management should begin with prevention and sanitation. Maintain appropriate moisture levels and adequate drainage. Use mulch to prevent ground contact and plant into raised beds when possible. Fallow and sanitize greenhouses between crops. Solarization of high tunnels can reduce populations. Fungicides can help prevent or reduce disease. Mildly affected lettuce heads can often be marketed by removing infected lower leaves.

Drop, Lettuce Drop (*Sclerotinia sclerotiorum*) is a soilborne fungal disease that infects lettuce crowns and lower leaves. Initially, plants become dull and wilted while crown tissue becomes soft and decayed. As disease progresses, whole plants collapse and become mushy. Sclerotia, hard black survival structures that resemble rat droppings, are present around the crown and lower leaves. Mycelia, the white threadlike body of the fungus, extends from the crown into the lower leaves and head. Host range extends beyond lettuce to include most commercial crops and cover crops; monocots are nonhosts. *Sclerotinia* sp. favors cool conditions (below 65°F) and, in Kentucky, is most prevalent in fields and high tunnels in April and May. Once the pathogen establishes in soil, it is difficult to manage as sclerotia survive in soil for 3 years. To manage lettuce drop, rotate out of susceptible hosts for at least 3 years. Early planting of spring crops can help avoid the period when the fungus is active; fall crops are usually not affected. Late-planted crops such as summer vegetables will also avoid the active period. Solarization of high tunnels can reduce populations. Remove infected plants to avoid inoculum buildup. Fungicides can help prevent or reduce disease.

Lettuce mosaic virus (LMV, potyvirus) is a seedborne virus that causes stunting in young lettuce. Infected plants rarely reach maturity. Distortion such as twisting and curling may occur. Although LMV is uncommon, it can cause severe losses if seed lots are contaminated. LMV is also transmitted by aphids, which can move the virus from reservoir hosts such as weeds, ornamentals, or other infected plants. Plants that become infected in later stages of growth may develop mosaic or mottling. Management

focuses on prevention. Use certified seed or purchase plugs from a supplier who uses certified seed. Manage aphids and nearby weed populations.

Powdery mildew (*Golovinomyces* spp.) is a minor fungal disease that causes powdery growth on all lettuce tissue. Early infections appear as small patches of white fungal growth on upper and lower sides of older leaves. The causal fungus has a wide host range, including other vegetable crops, weeds, and ornamentals. *Golovinomyces* sp. is usually present in fields, high tunnels, and greenhouses. Disease can establish under a wide range of conditions, but it is most severe at moderate temperatures (65 to 70°F). Although this fungus can tolerate low humidity conditions, disease is more likely in greenhouses and high tunnels where humidity is high. Powdery mildew is more common on fall lettuce in Kentucky. Management in greenhouses and high tunnels should focus on increased air circulation and exchanging humid air. Manage nearby weeds to reduce inoculum. Preventative fungicides are effective when conditions are conducive for disease.

Pythium root rot (*Pythium* spp., *Phytopythium* spp., *Globosporangium* spp.) is caused by a group of soilborne, fungus-like pathogens known as water molds. Symptoms include overall stunting or wilting, with marginal leaf scorch or yellowing of outer leaves that becomes more severe as root rot progresses. Roots become soft, mushy, and grayish-brown, and the cortex sloughs off leaving the stele intact (known as “rat tails”). These pathogens can also cause damping off in which seeds are infected before or after emergence. These water mold species favor wet soils, and optimal temperatures are dependent upon species. Water mold pathogens can also become established in irrigation lines and hydroponic systems. Fungus gnats are known to transmit *Pythium* spp. Management begins with water management. Maintain appropriate moisture levels and adequate drainage. Avoid movement of water via splash and wet surfaces such as tools, equipment, and shoes. Do not introduce diseased plugs into production systems. Avoid movement of contaminated soil and media. Remove dead, dying, and diseased plants as soon as they appear. Fallow and sanitize greenhouses and hydroponic systems between crops. Solarization of high tunnels can reduce populations. Fungicides can help suppress disease or prevent new infections.

Root-knot nematodes (RKN, *Meloidogyne* spp.) are microscopic round worms that colonize agricultural soils. RKN infestation is first characterized by yellowing, stunting, wilting, or declining plants. Swollen areas or “knots” develop on roots, which inhibit water and nutrient uptake, resulting in above ground symptoms. Root-knot nematodes have a wide host range and are most common in coarse or sandy soils in fields and high tunnel production systems, especially in heavily cropped sites with limited rotation. They are most active in warm soils (70 to 80°F) and pose a greater risk to fall lettuce crops. Management of RKN should begin by preventing introduction via soil movement. Once RKN is established in fields, avoid movement of contaminated soil to prevent spread. Rotate with non-host crops for at least 3 years. Solarization of high tunnels can reduce populations. Nematicides can help reduce RKN activity, but do not reduce nematode populations.

DISEASE MANAGEMENT

Cultural practices that include proper sanitation, reduced humidity, and regulated soil moisture are keys to reducing the incidence and severity of common lettuce diseases. Fungicides can also be used to protect healthy tissue from disease. The following details best practices for lettuce disease management. Under high disease pressure, cultural practices and fungicides should be used together.

Cultural practices

- Promote good air circulation:
    - Select planting sites with good air movement.
    - Provide adequate spacing between plants; thin plants as needed.
    - Ventilate greenhouses and high tunnels to increase air movement and to keep humidity levels below 70% for management of fungal diseases and 85% for bacteria and water mold diseases. Open vents or use fans as needed.
- Avoid overhead irrigation to reduce excess surface moisture.
- Avoid irrigating late in the evening to reduce persistent leaf wetness.
- Avoid excess nitrogen applications, which promote development of succulent tissues that are susceptible to infection.
- Remove dead, damaged, and senescing tissues that can provide nutrient sources for some fungi.
- Remove and destroy diseased plant tissues and, if necessary, entire plants. Do not compost diseased material.
- Use carts or tarps when removing plants or plant tissue. This reduces residual debris that can harbor inoculum.
- Use sharp tools for cutting and trimming; avoid tearing and excess wounding.
- Clean greenhouse surfaces (such as floors and woven weed mat) by sweeping. Wash benches, floors, and tools as needed and between crops.
- Clean and sanitize tools between fields or zones.
- Handle harvested produce with care to prevent bruising and wounding.
- Store produce immediately after harvest at recommended temperatures and humidity.

Fungicides

Disease management can be aided by applying contact or systemic fungicides to protect healthy tissues from infection. Always combine cultural practices with fungicide applications. For specific information regarding recommended fungicides, contact a local county Extension office or appropriate University of Kentucky disease management guide.

- Soilborne diseases can be managed by soil drench or chemigation at or after planting with fungicides or nematicides.
    - Some soilborne diseases can be suppressed but not controlled with fungicides.
    - Product persistence in soils is limited.
- Diseases of above-ground plant parts can be managed with spray applications of fungicides or bactericides.
    - Some diseases can be suppressed but not controlled with fungicides or bactericides.

    - Products will not cure disease after infection occurs.
- Alternate between fungicides in different chemical groups (FRAC code) to reduce the risk of resistance development.
- Remove diseased plant parts before applying fungicides or bactericides.
- Products used in greenhouses and high tunnels must be allowed by either explicit labeling or should not be labeled as prohibited in greenhouses.
- Read and follow all label instructions.

Disease management considerations for common diseases of lettuce

	Bacterial soft rot	Black root rot	Botrytis gray mold	Lettuce drop	Lettuce mosaic virus	Powdery mildew	Pythium root rot	Rhizoctonia bottom rot	Root-knot nematode
Clean seed/cuttings		X			X		X	X	
Crop rotation*		X		X			X	X	X
Deep till		X		X			X	X	X
Drainage, site selection	X						X	X	X
Drip irrigation			X						
Environmental conditions	X		X			X	X	X	
Fungicide/nematicide drench		X							X
Fungicide/bactericide application	X		X	X		X	X	X	
Insect management		X			X		X		
Minimize splash, mulch							X	X	
Plant spacing, air circulation	X		X	X		X		X	
Plant vigor	X						X	X	
Raised beds, surface drainage	X						X	X	
Reduced wounding/injury	X		X					X	
Removal of diseased plants/tissue	X	X	X	X	X	X	X	X	
Resistant/tolerant cultivars		X		X	X			X	
Sanitation of tools & equipment	X	X		X	X		X	X	X
Solarization		X		X			X	X	
Weed management		X			X	X	X		X

*A 2-to-3-year crop rotation is recommended for all fields and high tunnel production systems. Some soilborne pathogens, however, can survive for many years in soil. Refer to specific resources for recommended rotation intervals and rotational crops.

ADDITIONAL RESOURCES

Disease Publications

- Black Root Rot of Ornamentals (PPFS-OR-W-03) - https://plantpathology.ca.uky.edu/files/ppfs-or-w-03.pdf
- Botrytis Blight (PPFS-GEN-19) - https://plantpathology.ca.uky.edu/files/ppfs-gen-19.pdf
- Damping-off (PPFS-GEN-03) - https://plantpathology.ca.uky.edu/files/ppfs-gen-03.pdf
- LMV Reservoir Hosts - https://ipm.ucanr.edu/agriculture/lettuce/lettuce-mosaic/#gsc.tab=0
- Powdery Mildew (PPFS-GEN-02) - https://plantpathology.ca.uky.edu/sites/plantpathology.ca.uky.edu/files/PPFS-GEN-02.pdf
- Rhizoctonia Diseases in Specialty Crop Production (PPFS-GEN-21) - https://plantpathology.ca.uky.edu/files/ppfs-gen-21.pdf
- Root-knot Nematode in Vegetable Cropping Systems (PPFS-VG-28) - https://plantpathology.ca.uky.edu/files/ppfs-vg-28.pdf
- Sclerotinia Diseases of Vegetable Crops (PPFS-VG-29) - https://plantpathology.ca.uky.edu/files/ppfs-vg-29.pdf

Cultural Management Publications

- Cleaning & Disinfecting Hand Tools & Planting Supplies (PPFS-GEN-17) - https://plantpathology.ca.uky.edu/sites/plantpathology.ca.uky.edu/files/PPFS-GEN-17.pdf
- Cleaning & Sanitizing Commercial Greenhouse Surfaces (PPFS-GH-07) - https://plantpathology.ca.uky.edu/files/ppfs-gh-07.pdf
- Managing Greenhouse & High Tunnel Environmental Conditions to Reduce Plant Diseases (PPFS-GH-01) - https://plantpathology.ca.uky.edu/sites/plantpathology.ca.uky.edu/files/ppfs-gh-01.pdf
- Sanitation Practices for Disease Management in Commercial Specialty Crop Production (PPFS-GEN-05) - https://plantpathology.ca.uky.edu/sites/plantpathology.ca.uky.edu/files/PPFS-GEN-05.pdf

Fungicide Management Publications (Conventional and Organic)

- Vegetable Production Guide for Commercial Growers (ID-36) - https://publications.ca.uky.edu/files/ID36.pdf
- Organic Disease Management Guide for Specialty Crop Production - https://plantpathology.ca.uky.edu/sites/plantpathology.ca.uky.edu/files/Organic_Disease_Mgmt_PPFS-FF.pdf
- Southeastern U.S. Vegetable Crop Handbook (2025) (SEVEW) - https://vegetables.tennessee.edu/southeastern-vegetable-crop-handbook/