

Rhizoctonia Bottom Rot of Lettuce

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Bottom Rot caused by *Rhizoctonia solani* was confirmed from a lettuce sample received by MU Plant Diagnostic Clinic. This soilborne fungus is known for causing damping-off and bottom rot on a broad range of plants when they approach maturity, both in open fields and under shelter. It is most economically damaging during harvest when growers must trim plants with rotten leaves, reducing both the quality and yield.



Figure 1. Early-stage Symptom of Rhizoctonia Bottom Rot. Photo credit: Gerald Holmes



Figure 2. Late-stage symptom of Rhizoctonia Bottom rot. Photo credit: Gerald Holmes

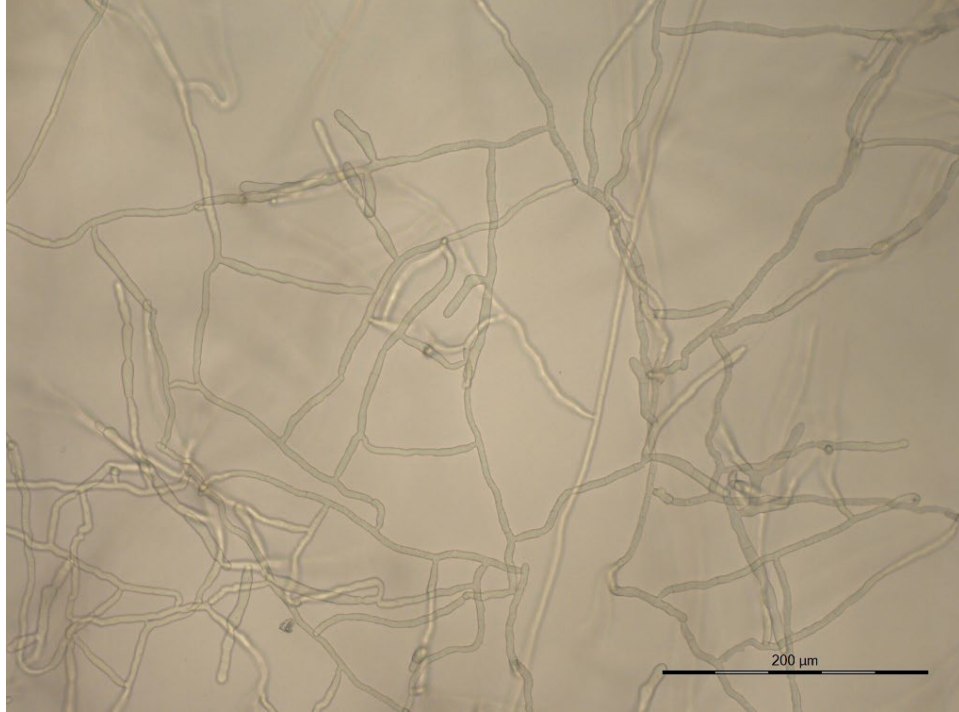


Figure 3. Hyphae of *Rhizoctonia solani* observed under compound microscope.

Symptoms and signs:

Bottom rot symptoms typically develop first on lower leaves in contact with the soil and appear as small, rust-colored brown spots, mainly under leaf midribs (Figure 1). Symptoms generally are most pronounced at heading. Bottom rot can spread to midribs and leaf blades rapidly when conditions are favorable. Stems are relatively more resistant to bottom rot and are the last portion of the head to decay (Figure 2). Decaying heads are at first slimy and brown but become dark brown to black as they collapse and dry. A webbed network of white to brown mycelium often grows over lesions, and small gray, brown sclerotia later are apparent (Figure 3). *Botrytis cinerea* and bacteria may begin to colonize on the damaged tissues and accelerate the rotting.

Causal Agent:

Bottom rot is caused by the soil-borne fungus *Rhizoctonia solani*. Infection occurs when sclerotia (dormant resting structures) germinate and produce mycelia that penetrate healthy or wounded tissue. The pathogen infects lettuce over a wide range of temperatures but is favored by warm (77 °F to 81°F), moist conditions. *Rhizoctonia solani* is a very common soil inhabitant, and some strains of the fungus can attack other hosts including potato, onion, dry bean, wheat, and corn. The pathogen survives between lettuce crops as sclerotia or mycelium in soil and crop debris. It can also survive on alternate hosts and can be introduced into a field by spores in wind and water.

Life cycle of pathogen:

Rhizoctonia solani is found in soils that have grown a succession of vegetable crops. The fungi can survive in the soil even when no hosts are present, and on a wide variety of hosts and their debris. It may be present in certain substrates and composts, on polluted equipment that has not been disinfected, and is moved into new areas by any manner that moves soil from one place to another. Wind and water can also move spores very long distances. In warm and moist conditions that are favorable to development, mycelium penetrates plant tissue that is in direct contact with the ground and bottom rot ensues. The occurrence of bottom rot is heavily influenced by the previous crop, the length of time between crops, and how well the *Rhizoctonia solani* can survive in the soil.

Disease Management:

Plant lettuce varieties with an upright architecture to reduce foliage contact with the soil. Practice a three-year or longer rotation to non-hosts. Destroy crop residues by plowing deeply after harvest to reduce pathogen survival. Practice effective weed control to eliminate alternate hosts between lettuce crops. Plant lettuce on high beds to promote air movement, drainage, and minimize foliage contact with the soil. Avoid irrigation near harvest. Fungicides are most effective when used in combination with cultural control strategies. Proper placement and timing of fungicide applications are essential for effective disease control.

References:

1. Blancard, Lot, Maisonneuve. A Color Atlas of Diseases of Lettuce and Related Salad crops: Observation, Biology, and Control. Academic Press. 2006
2. Bell, et all. Compendium of Lettuce Diseases. American Phytopathological Society. 1997
3. Howard, Gent. Lettuce Bottom Rot. BugwoodWiki. 2015, April 27.
https://wiki.bugwood.org/HPIPM:Lettuce_Bottom_Rot
4. Holmes, Gerald. Rhizoctonia damping-off, blight and rot (*Rhizoctonia solani*). Forestry Images. Dec. 1995.
<https://www.forestryimages.org/browse/autimages.cfm?aut=35540>

We encourage you to visit our website [Plant Diagnostic Clinic | MU Extension \(missouri.edu\)](#) and review submission guidelines before submitting your sample. If possible, you may take photos and send them to plantclinic@missouri.edu.

Watch this recent MU Extension video for lab information and guidelines on submitting plant samples! Please click here: https://www.youtube.com/watch?v=9g312_U1iil

For sample submission and fee payment, you can either:

1) Visit our new online submission system at [Plant Disease Sample | MU Extension \(missouri.edu\)](#). Fill out the submission form online using your computer or mobile device and make payment online securely with a credit card.

2) Download the submission form at [Physical sample submission | MU Extension \(missouri.edu\)](#). Fill it out and send to us together with your sample and payment. Check or money order. No cash please.